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ABSTRACT

This paper presents a plan for federal financing of higher education that would also promote positive incentives for the sectors involved in postsecondary education. The underlying rationale of this financing plan is to give the greatest help to institutions that enroll students from those states that are making the largest efforts in support of education. The federal government would provide general assistance directly to institutions of postsecondary education through a financing program that is tied to the students enrolled. To receive its general assistance dollars, an institution would have to report only the number of students it has enrolled from each state. The federal government would then multiply these enrollment figures by the grant associated with students from each state. The dollars resulting from this calculation would then be given directly to the reporting institution. A separate 20-page synopsis of the plan is included with the report. (Author/HS)

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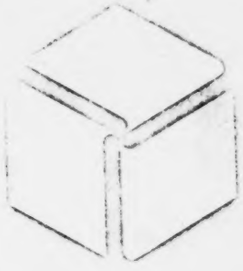

National Center for Higher Education Management Systems at WICHE

General Institutional Assistance: A Scheme that Depends on the Educational Efforts Of the States and the Attendance Choice of Students

(Revised)

BY

Wayne Kirschling, D.B.A.

AND

Rudy Postweiler, Ph.D.

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A SCHEME THAT DEPENDS ON THE EDUCATIONAL EFFORTS OF THE STATES AND THE ATTENDANCE CHOICE OF STUDENTS

(Revised)

by

Wayne Kirschling, D.B.A.

Rudy Postweiler, Ph.D.

December 1971

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PREFACE

If one were to identify a single issue that would most influence future directions in postsecondary education, a prime candidate, in our opinion, would be the forms of federal financing that emerge. Certainly, large sums of money can create strong positive or negative incentives, and the ramifications of federal financing for postsecondary education will be far-reaching. The total number of dollars involved will not have the only impact on higher education; equally important will be the recipients of financial support and the disbursement policies that control the flow of federal dollars to higher education. Further, incentives build over time, and the influences of federal financing will have an effect over long time horizons. Perhaps impacts will be greatest long after a particular financing plan is discontinued or modified. The problem of developing effective federal financing approaches is complicated by the fact that financial needs can be defined only in terms of the goals of postsecondary education.

To document conclusively all the financial needs of higher education is extremely difficult, particularly to the extent that would be necessary to specify categorically the amount, recipients, and priorities associated with federal financial support to postsecondary education. We feel, however, that it is possible to develop general assistance plans that provide reasonably consistent long-term incentives for all sectors of postsecondary education.

The work of our Research Program in the National Center for Higher Education Management Systems at WICHE has focused on general institutional assistance since higher education and the federal government have found it extremely difficult to formulate a viable financing plan in this area and arrive at any degree of consensus. We are confident that the general institutional assistance plan presented in this paper has a good deal of merit and are anxious for it to receive the careful attention of analysts and policy makers concerned with higher education. Actually, it is not appropriate to present the federal financing approaches developed in this paper as a single plan. Rather, a large number of different variations of a very general approach have been developed, and the flexibilities available to the policy maker are an important ingredient of this general institutional assistance approach.

While our primary objective has been to develop a viable federal financing plan, we feel that the methodologies utilized in the analysis of this plan may be just as significant. The research effort has focused on the impact of changes in postsecondary education that might be induced over time as variations of the plan are implemented and as incentives are created for certain sectors. These elements of analysis are, we believe, vitally important, and it is our hope that they will stimulate further work in this direction.

We, along with Dr. Kirschling, will be pleased to receive suggestions and reactions to this research paper.

Dr. Ben Lawrence
Director, National Center for Higher Education Management Systems at WICHE

Dr. Robert A. Wallhaus
Director, Research Program

ACKNOWLEDGMENTS

Shortly before the scheduled publication of this paper, Rudy Postweiler died. My association with him as a colleague and, more importantly, as a friend, was both stimulating and rewarding. I, along with a great many people, will miss him.

I also wish to take this opportunity to thank publicly several other persons who have influenced this paper by their insights and their suggestions. Robert Wallhaus initiated our efforts by suggesting a general scheme for measuring the relative educational efforts of states. He, along with Paul Wing and Stephen Hoenack, also provided helpful comments on earlier versions of this paper.

Wayne Kirschling

November 1971

INTRODUCTION

The development of viable approaches for providing federal support to students, institutions, and states is a pressing problem in higher education. Current discussions tend somewhat to obscure the fact that federal support of higher education has long been one of the ways in which higher education is financed. Rivlin (1961, p. 9) has pointed out that:

> The history of federal participation in financing higher education in the United States goes back to the beginnings of the Republic. In the first hundred years, however, participation was relatively simple. With minor exceptions, such as the establishment of military academies, federal support of higher education before 1890 was confined to a single form - the granting of public lands to the states to support "seminaries," colleges, and universities. Since the closing years of the nineteenth century, the range of federal activities has expanded to include direct loans and grants to institutions, fellowships and loans for students, research contracts, extension programs, and a wide variety of other forms of federal involvement in higher educational finance.

However, while the various forms of federal support of higher education have long been known, current discussions have helped to further delineate their assumptions, implications, and incentives. Wolk (1968, p. 9), for example, identifies five major methods of federal funding: (1) Categorical Aid (2) Aid to Students (3) Institutional Grants (4) Tax Relief, and (5) Revenue Sharing and Aid to States. (Wolk's methods of federal funding are nearly identical with the methods that have been identified by other writers. See, for example, M. D. Orwign, ed., Financing Higher Education: Alternatives for the Federal Government [Iowa City, Iowa: The American College Testing

Program, 1971]; and The Economics and Financing of Higher Education in the United States, compendium of papers submitted to the Joint Economic Committee, Congress of the United States [Washington, D. C.: U. S. Government Printing Office, 1969]. Jointly, these three readings provide an excellent overview of the current discussion related to the federal support of higher education.) Each of these five major methods has its proponents and its detractors, and each has received widespread attention. Of these five methods, student aid and institutional aid are receiving a large portion of the attention of those who form federal policy.

Student Aid

In the student aid area, two major types of student aid are being advanced. The first type is no-obligation grants to students. This topic often is addressed under the rubric of equal opportunity. Under this type of student aid, students are given help in paying for their education with no obligation to repay except through general taxes. This type of student aid takes several forms. First, it can take the form of reduced or zero tuitions. These less-than-full-cost tuitions are justified on the basis of providing equal access to all students in a state. (The redistribution effects of this type of scheme, which makes higher education available at a reduced price to all income groups on an equal basis, are in doubt. Two separate studies have indicated that public education may in fact redistribute income from the poor to the rich. These two studies are: W. Lee Hansen and Burton

A. Weisbrod, Benefits, Costs, and Finance of Public Higher Education [Chicago: Markam Publishing Company 1969]; and Douglas M. Windham, Education, Equality and Income Redistribution [Lexington, Massachusetts: Heath Lexington Books, 1970]. The first of these studies used California data while the second used Florida data. The correctness of the Hansen-Weisbrod study has been challenged by Peckman. See Joseph A. Peckman, "The Distributional Effects of Public Higher Education in California," Journal of Human Resources, V [Summer, 1970], 361-70.)

The second form that no-obligation student grants take are outright cash payments to economically disadvantaged students. In contrast to tuition grants that are available to all students, cash grants are usually available only to students from low income families. This form of student aid usually is justified in two ways. First, the claim is made that reduced tuitions, by helping all students, help high income students who do not need aid. Second, the claim is made that low income students will not be able to attend higher education institutions unless more of their costs are covered than just tuition. (Even after a decision has been made to help "poor" students rather than all students, there still remains the question of whether to distribute limited dollars among a few "very needy" students or among many "moderately needy" students. For excellent treatment of this problem, see Stephen A. Hoenack, "The Efficient Allocation of Subsidies to College Students," American Economic Review, [June, 1971], 302-11. For a discussion of how various minorities react to the present system of student

aid, see Financing Equal Opportunity in Higher Education, A college of Scholarship Service Colloquium held at Mountain Shadows, Scottsdale, Arizona, November 9-13, 1969 [New York: College Entrance Examination Board, 1970].)

The second type of student aid that is being advanced in addition to no-obligation grants is student loans. The most often quoted rationale for this form of student aid is that it transfers the burden of education to those who benefit from education: the students. Dobell and Judy (1969, Foreword of Cook and Stager) have correctly pointed out the oversimplification of this rationale:

> In particular, it should be kept in mind that there is almost no way (short of work/study or summer employment programs) by which the student, while he is a student, can bear the entire burden of postsecondary education costs. If purchase of the necessary resources is financed wholly out of direct tuition charges, the burden is shifted back onto the past savings of the student or across the generation gap to his parents. If education is financed wholly out of general revenue, through grants to students or direct support to institutions, the effect is to shift the burden to the general taxpayer and, perhaps, to redistribute wealth in an undesirable way among socio-economic classes. If education is financed wholly through a program of loans or repayable advances, the effect is ultimately to shift the burden forward in time, from students to alumni. To speak of a loan program shifting the burden of financing higher education to the student, then, is simply to be bemused by rhetoric. A loan program does precisely the contrary: it initially shifts the costs from those who are students today to those who were students yesterday. It enables the student to transfer a command over resources from the future to the present, by persuading those now older to engage in a trade through time with those now younger. It frees the student of dependence on his economic background, on the income or wealth of himself or his parents, by throwing the burden on to his own economic future.

But even if it is not possible to transfer the burden of education to students in a strict sense, students over their lifetime certainly do absorb more of the costs of their education under a loan program than they do under a grant program. It is possible, however, even under a loan scheme to vary significantly the burden of the educational costs that each student has to absorb. The burden of an individual student's costs can be shifted, even under a conventional loan, by reducing the interest, extending the repayment period, and requiring the student to repay larger amounts only as his income rises. All of these techniques do not, however, change the fundamental characteristic of a conventional loan since each individual must eventually repay the entire amount that he has borrowed. (For an excellent discussion of the many ramifications and details surrounding conventional student loans, see Robert W. Hartman, Credit for College: Public Policy for Student Loans, A Report for the Carnegie Commission on Higher Education [New York: McGraw-Hill Book Company, 1970]. One of the more significant ways in which the federal government can affect the student loan market is through the operation of a National Student Loan Bank. Senate Bill 659, which was passed by the U. S. Senate on August 6, 1971, contained a provision for creating a Student Loan Marketing Association that would warehouse student loans and create a secondary market for such loans. For a discussion of the details of this proposal, see Report of the Committee on Labor and Public Welfare on S. 659, United States Senate, August 3, 1971 [Washington, D. C.: U. S. Government Printing Office, 1971].)

Currently under debate are several student loan concepts that could drastically change the nature of repayment. For example, students who participate might be required to repay a percentage of their income for a fixed number of years. Under this scheme some students would then end up paying more than they borrowed while others would end up paying less. The critical decision under this scheme, then, assuming that loans in the aggregate must be repaid, is on what basis the group of students who will jointly share loan repayment responsibilities is to be defined. This grouping could, for example, be defined as all students who graduate from or leave an institution in a particular year.

This definition of a loan grouping has the inherent difficulty that some graduates a priori have low expected incomes--women and social science graduates, for example. The difficulty introduced then is that students who expect their degree to lead to high incomes will not participate in this scheme and hence be unavailable for subsidizing low income graduates. Another version of this scheme might be to define a loan grouping as all students who graduate with a certain degree from any institution. Under this proposal the expected income differences between different degrees would be compensated for, but serious questions still remain about the administration of this plan and about the willingness of certain types of students to assume long term group debt.

Institutional Aid

Regardless of the direction federal student aid takes, it seems likely that additional direct federal support of institutions will be forthcoming.

While comprehensive and compelling evidence that all or most institutions are in financial trouble and will remain so in the future is not presently available, fragmentary evidence from many sources indicate that financial difficulties have beset a good number of institutions. Representative of the evidence that is becoming available is a study by Cheit (1971) of the financial conditions at forty-one colleges and universities.

While the present system of category grants to institutions seems certain to continue in the near future, it also seems quite certain that some of the federal aid to institutions in the future will take the form of general assistance rather than just categorical grants. This direction in federal aid to institutions appears to come on the heels of a general recognition that there are very few educational fields, if indeed any, in which institutions across the board are weak. Rather, the situation is that an institution may have strong and weak fields, but that these fields rarely coincide for groups of institutions. Hence, the situation may call for giving institutions unrestricted grants so that potentially they can shore up weak areas without weakening strong areas.

While the advisability and the necessity for general assistance to institutions are gaining acceptance, no general consensus on the amount, duration, and form of this support has yet evolved. Three bills introduced during the 92nd session of Congress should serve to illustrate the variety of general institutional aid approaches presently under consideration. The

first of these bills is House of Representatives Bill, H. R. 5193, introduced by Congressman Albert Quie (1971, Sec. 2, Paragraph 2). This bill declares that:

> Colleges and universities need and deserve general financial assistance from the Federal Government to supplement their other sources of income in order to advance quality higher education in the United States.

To accomplish that purpose, the bill provides general assistance to institutions based on the number of baccalaureate degrees awarded, with the amount per degree decreased for larger institutions.

Congresswoman Edith Green's bill (1971, Sec. 1201, pp. 74-75), H, R. 7248, speaks of the need to provide general institutional assistance to meet "an emergency condition (which) has arisen." This bill provides that the amount of general assistance shall be tied to the number of lower division, upper division, and graduate students enrolled in each institution.

The fundamental difference between the Quie and Green bills, then, is whether students or degrees are to be used to calculate the amount of general assistance required. While either measure--students or degrees--seems feasible, students seem a more general indicator of financial needs. Although the use of degrees would seem to reward output, it may be that higher education should not be given an added incentive to give each student a degree so that it can receive additional federal support. In fact, it may be that higher education is moving away from the certification process implied by the degree measure.

Senator Pell's bill (1971, Sec. 123, Paragraph 2, and Sec. 419), passed by the Senate on August 6, 1971, has two provisions relating to general institutional assistance. One provision of the Pell bill concerns itself solely with "interim emergency assistance" to help those instituions that are deemed "to be in serious financial distress." The second provision related to general assistance is described as "cost-of-instruction allowances." This provision of the Pell bill would provide general institutional assistance as a function of the number of students in each institution currently receiving Educational Opportunity Grants. Furthermore, the amount of general assistance per student would be reduced for larger institutions.

(The long-term advisability of basing general institutional assistance upon the number of students receiving Educational Opportunity Grants needs further study even if this general assistance is entitled Cost-of-Instruction allowances. Theoretically, one of the purposes of Educational Opportunity Grants to students is to give them a reasonable ability to "pay" for their education. Given, then, that Educational Opportunity Grant Students are expected to pay tuition like other students, it is difficult to see why an institution needs "cost-of-instruction" allowances for only these students rather than for all of its students. This is not to say that this method of providing general assistance is without its proponents. The Carnegie Commission in December 1968 [Hightstown, New Jersey: McGraw-Hill Book Company] released a special report containing recommendations of the Commission. In this report, entitled Quality and Equality: New Levels of Federal Responsibility for Higher Education, the

Commission recommended that "the federal government grant cost-of-instruction supplements to colleges and universities based on the numbers and levels of students holding federal grants enrolled in the institutions." Nonetheless the distinction needs to be made that the Quie bill uses the number of degrees, the Green bill uses the number of students, and the Pell bill uses the number of Educational Opportunity Grant students to calculate the amount of general assistance required.)

Both the Green and the Pell bills seem to be biased more toward using general assistance as a device for alleviating the current financial distress of institutions than as a device for fundamentally changing the income structure of institutions in the long run. The "cost-of-instruction allowances" feature of the Pell bill may be an exception to this generalization. It is unclear from the Pell bill whether or not this program is intended to be a continuing program, or whether it is expected to be phased out when and if the current financial crisis is eased. In contrast to the Green bill and to certain features of the Pell bill, the Quie bill makes no specific reference to any financial crisis. The inference could be then that Congressman Quie envisioned a much longer term federal commitment with his general assistance proposal than did either Green or Pell.

While general institutional assistance can indeed serve an emergency purpose, it is important to realize that not all the current proponents of general

institutional assistance have this purpose in mind. For example, as early as 1969, the American Countil on Education (Federal Programs for Higher Education, 1969, p. 17) took the position that:

> . . .beyond adequate funding for existing programs, the principal unfinished business of the Federal Government in the field of higher education is the necessity to provide support for general institutional purposes. Associations presenting higher education are virtually unanimous in their agreement on the need. The Government has a precedence, established in 1862 in the Morrill Act, of the efficacy of such an approach. The proposal seems to us an obvious and logical extension of the Federal investment in higher education.

More recently, the National Association of State Universities and Land-Grant Colleges, representing 118 public and land-grant universities and colleges, and the American Association of State Colleges and Universities, representing 275 institutions, issued a joint statement (1970, pp. 3-4) that made the following observations:

> Sooner or later, the federal government will have to undertake an adequate program of institutional aid. A model for such assistance is the land-grant teaching assistance program which provided unfettered money for institutions designated as land-grant colleges . . . What is needed is to expand the concept of operational aid to all institutions, public and private . . . We will support and bill with a reasonable formula for institutional aid. . . .

Regardless of whether general assistance is being proposed as a short or a long-run device, proponents of this approach have recognized several pitfalls, that must be avoided. It is generally accepted that the most relevant danger

associated with the shift to general assistance funding is the danger that increased federal support will be accompanied by a dilution of nonfederal effort. The American Council on Education (1969, pp. 19-20) has made the following pertinent observations about general assistance:

> We must naturally be concerned with the fears expressed that federal funds may simply replace funds raised from nonfederal sources, and we must build safeguards to assure that this does not happen. But the history of federal programs is reassuring - Federal funds appropriated for the support of land-grant colleges have greatly stimulated both state and private support of institutions founded under the Morrill Act, federal funds appropriated for agriculture extension and research and for vocational education have been matched by nonfederal sources far in excess of legislative matching requirements, privately sponsored student loan programs were virtually nonexistent prior to the enactment of the NDEA loan program . . ., the enactment of the Federal Opportunity Grants program has not driven nonfederal sponsorship of scholarships out of the market. . .It is our observation that when the Federal Government determines that a given area of activity warrants the investment of public funds, other nonfederal sources are quick to follow.

Others are not so confident as the Council that nonfederal sources will maintain their effort in the face of increased, unrestricted federal dollars. Among these skeptics could be included both Representatives Green and Quie. Their bills contain identical provisions that institutions receiving institutional assistance will have to:

> . . .expend during the fiscal year for which the grant is requested (from funds other than funds received under this Act) for all academically related programs of such institution an amount not less than the average annual amount it expended for such programs for the two fiscal years preceding the fiscal year for which the grant is requested.

President Nixon in his 1970 Higher Education Message to Congress also expressed an overall concern for nonfederal maintenance of effort. While encouraging the federal establishment to accept the proposition that "no element of our national life is more worthy of our attention, our support and our concern than higher education," he also insisted that "[federal] support should complement rather than supplant additional and continuing help from all other sources."

It is important to note that while the Green and Quie bills indirectly require a maintenance of present effort, they do not in any way reward additional effort in the Nixon sense. That is, the Green and Quie bills require each institution to maintain its present rate of spending. Since institutions do not in general have revenue-generating capabilities, this provision forces institutions to maintain their present funding sources from students, legislatures, or private benefactors. Those institutions that can achieve this maintenance of effort with relatively little effort will be rewarded in the same way as those institutions that must put forth extra effort because their sources of funds are faced with other serious demands. The Green and Quie maintenance-of-effort proposal is also an either/or proposition. If an institution maintains its present levels of spending, it is eligible. But if an institution does not maintain its present level of spending, it is not eligible.

Purpose of this Paper

In his 1970 Higher Education Message, President Nixon noted:

> As we enter a new decade, we have a rare opportunity to review and reform the federal role in post-secondary education. Most of the basic legislation that now defines the federal role will expire in the next fifteen months. The easy approach would be simply to ask Congress to extend these old programs. But the need for reform in higher education is so urgent, that I am asking the Congress for a thoroughgoing overhaul of federal programs in higher education.

In setting forth his program the President listed convictions that should guide any federal involvement in higher education:

- Equal Educational Opportunity, which has long been a goal, must now become a reality for every young person in the United States, whatever his economic circumstances.
- Institutional autonomy and academic freedom should be strengthened by federal support, never threatened with federal domination.
- Individual student aid should be given in ways that fulfill each person's capacity to choose the kind of quality education most suited to him, thereby making institutions more responsive to student needs.
- Support should complement rather than supplant additional and continuing help from all other sources.
- Diversity must be encouraged, both between institutions and within each institution.
- Basic reforms in institutional organization, business management governance, instruction, and academic programs are long overdue.

Quite obviously, no single program can meet all the requirements the President and others have formulated. We intend, however, to suggest a federal program that is consistent with and supportive of most of these requirements. We believe that this program has the potential to create the following national environment for higher education:

1. It will encourage institutions to develop programs that address themselves specifically to student needs, because the level of federal support to institutions is based on the number and type of students whom they can attract.

2. It will help preserve institutional autonomy and freedom, and encourage innovation by providing federal financial assistance directly to institutions in the form of general assistance.

3. It will recognize individual financial contributions that a state makes to education and will insist that it maintain these efforts if its students are to be eligible for continued federal help. Furthermore, this program will be sensitive to differing economic capacities of states to support education, and it will also reward states that do more than just maintain present financial effort.

We realize that this program is not a total approach, but we believe that it does involve a substantive shift of the federal role in financing postsecondary education. While this program will help some institutions experiencing financial crises, it must be stressed that it is presented as a long-run proposal and not as an emergency measure. Its financing aspects contain the potential for considerable educational innovation. This program is thus best approached on a cautious long-run basis.

President Nixon said that "1971 can be a year of national debate on the goals and potentials of our system of higher education." It is in this spirit that we make our proposal. The proposal is presented in two parts. Part I presents the basic proposal and its major ramifications. In this part, such terms as "education" and "population" are deliberately left general so that two different options of the basic proposal can be discussed in Part II.

PART I

THE BASIC PROPOSAL

This paper describes a new approach for federal general assistance financing to postsecondary institutions. For purposes of this paper, postsecondary education is considered to be all education beyond the secondary level, including academic, professional, and vocational components. We believe that a broader definition of higher education is needed if student needs are to be met. While this sentiment is gaining increasing support from the general public as well as the education community, we hasten to point out that a broad definition of higher education is not central to our proposal. For purposes of our proposal, higher education can be flexibly defined to include only those topics that are currently judged to be suitable for federal support. General assistance dollars would flow to institutions through the operation of a federal program that is tied to the number of students from the various states enrolling in each institution.

Under this program each state is considered an educational entity for the purpose of determining how much direct general assistance an institution that enrolls a student from that state will receive. The amount of general assistance that an institution receives for a student from a given state is referred to as the Institutional Grant per Student: IGS. The IGS will be equal in size for all postsecondary students of a given state at a given time. However, as will be explained shortly, the IGS's for students from different states or for students from the same state but who attend at different times, can vary.

The amount of general assistance dollars that an institution receives depends upon the number of students it enrolls and the size of the federal grant associated with each student it enrolls. It is entirely possible that smaller institutions might receive more general assistance dollars than larger institutions if students enrolled in the smaller institutions have larger IGS's.

Calculation of Federal Student Grants

The calculation of an Institutional Grant per Student (IGS) is a four-step process. The basic logic of this process follows:

Step 1 Calculate an index of each state's effort toward education. This index will be referred to as I_i, where i refers to State i.

Step 2: Determine, as a matter of federal policy, the minimum index level of state effort that will qualify for federal support. This minimum index level of effort will be referred to as I_T and will apply to all states.

Step 3: Associate with the students of each state an amount of federal money that is equal to the amount of money by which each state's education effort exceeds the minimum level. This federal support will be referred to as F_i.

Step 4: Impute a federal grant equal to F_i divided by S_i for each student in State i, where S_i is the number of students from State i who are enrolled in postsecondary institutions. The federal grant will be referred to as the IGS_i, where this Grant is the amount of general assistance that will be paid by the federal government directly to the institution enrolling a student from State i.

The details of this process follow.

Step One: Calculation of a State's Effort toward Education, The I_i Index

I_i is a composite index composed of two ratios. The first ratio measures a state's dollar contribution to education relative to its general economic capacity. To construct this ratio, it is necessary to define the following terms:

Let E_i = Annual state expenditures on education for State i.

Y_i = Aggregate personal income in State i.*

α = A constant for all states, which controls the amount of federal dollars provided relative to a state's expenditures on education. This term is a policy parameter to be established by the Federal Government.

The expressions "state expenditures" and "education" are deliberately left vague at this point in the discussion. A more detailed analysis of how these expressions could be defined is delayed until Part II of this proposal.

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*Aggregate personal income is used as a measure of a state's economic capacity. While more sophisticated measures of economic capacity can be constructed, comparable data across states on other measures are often unavailable. For a good discussion of this and related points, see Kenneth E. Quindry, State and Local Revenue Potential, Southern Regional Educational Board Research Monograph Number 14 (Atlanta, Georgia: Souther Regional Education Board, 1969).

Given these terms, the ratio $\alpha E_i/Y_i$ is taken as a measure of the ith state's educational effort in terms of dollars, relative to its economic capacity for providing financial support to education.

The second ratio measures a state's numerical effort toward providing post-secondary education for its population. To construct this ratio, it is necessary to define the following terms:

Let S_i = The number of students from State i currently enrolled in postsecondary education institutions. S_i includes students from a state enrolled in institutions within their own state or in institutions located in other states. It does not matter whether the institution is public or private.

N_i = The population of the ith state from which the S_i students are drawn.

N_i will probably include people over a restricted age range. Since age distributions can differ substantially from state to state, the manner in which the age range is defined might have significant impacts on individual states. This aspect of the plan is addressed more fully in Part II of this paper. Given the S_i and N_i terms, the ratio S_i/N_i is taken as a measure of the degree to which a state prepares, encourages, and directly or indirectly makes postsecondary educational opportunities available to its population. This ratio also indicates something about the value that a

state and its population place on postsecondary education in general, and even more specifically, on the current availability of postsecondary education.

The composite effort index, I_i, which combines both the dollar effort, $^{\alpha E}i/Y_i$, and the enrollment effort, $^{S}i/N_i$, is defined as:

$$(1) \quad I_i = \frac{\alpha E_i}{Y_i} \cdot \frac{S_i}{N_i}$$

Step Two: Establish Through Federal Policy the Minimum Acceptable Level of State Support

Step One enables us to calculate a series of fifty numbers, I_1 through I_{50}, where I_1 refers to the state making the largest relative effort toward education. If I_T is set below I_{50}, the federal government will provide federal support to students from all fifty states. If I_T is set above I_1, no student in any state would receive federal support. Thus no institution would receive general assistance dollars through the operation of this program. If I_T is set intermediate between I_1 and I_{50}, then only students from those states whose I_i is greater than I_T will have a positive Institutional Grant per Student, IGS_i. In this last case, institutions will receive general assistance only for those students they enroll from states whose I_i is greater than I_T because only these students will have positive IGS_i's.

Step Three: Calculate Each State's "Extra" Dollar Effort Toward Education

Each state's composite effort Index, I_i, is now adjusted, through the αE_i term, to make $I_i = I_T$. For each state, there is some E_i° value that, when substituted for αE_i of that state, will make $I_i = I_T$. This E_i° value can differ for each state and will result in equation (1) taking the form:

$$(2) \quad I_T = \frac{E_i^\circ}{Y_i} \cdot \frac{S_i}{N_i}$$

where E_i° is the minimum expenditure that a state would have to make to meet the minimum composite effort set by the federal government, I_T. Now, each state that is going to receive federal support for its students, F_i, will have spent an amount, αE_i, which is greater than this minimum level, E°. For this proposal, the federal government will provide to the institutions enrolling the students of each state an amount of money equal to the "extra" effort that a state makes over and above its minimum level. Hence,

$$(3) \quad F_i = \alpha E_i - E_i^\circ, \text{ or}$$

$$(4) \quad E_i^\circ = \alpha E_i - F_i.$$

When equation (4) is substituted into equation (2), we have:

$$(5) \quad I_T = \frac{\alpha E_i - F_i}{Y_i} \cdot \frac{S_i}{N_i}$$

Finally, by rearranging (5), we arrive at:

$$(6) \quad F_i = \alpha E_i - (I_T Y_i N_i)/S_i$$

Where F_i is, of course, the total amount of federal dollars that will be distributed to institutions that enroll students from State i. The implications of Equation (6) are more easily seen from its graphical form, shown in Figure 1. This figure reflects the respective roles that state expenditures, E_i, and student enrollments, S_i, play in Equation (6) in determining federal support, F_i. Modified state expenditures, αE_i, form an upper limit on the amount of federal support to any state. This upper limit will be reached asymptotically as student enrollments are increased.

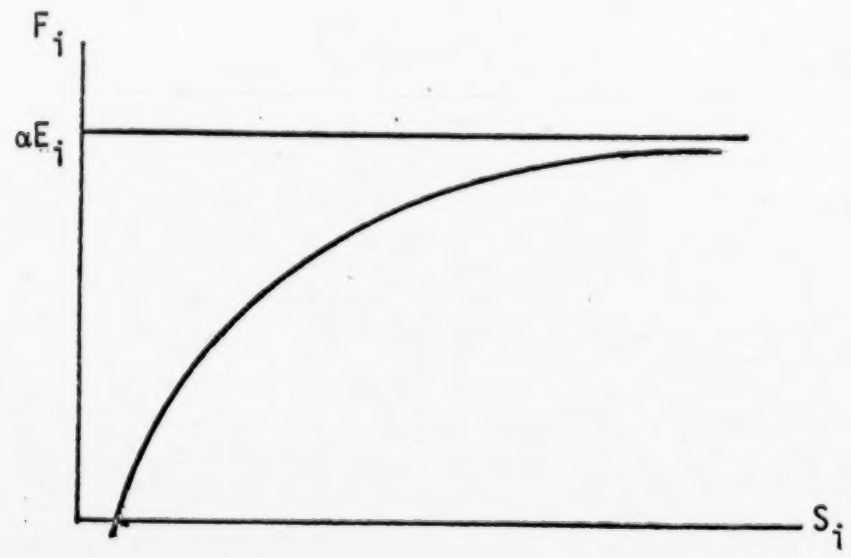

FIGURE 1: Graphical Representation of Equation (6)

It is important to note that α and I_T are constant across all states. This means that the federal government, through its policy variables, α and I_T, will not affect one state differently from all other states.

With this general background, it is now possible to examine in detail the individual effects that the variables characterizing each state, S_i, E_i, Y_i, and N_i, and the federal policy variables α and I_T, have on F_i.

The Variables Characterizing the States

There are four variables of interest. The four variables that will normally differ among the fifty states are S_i, E_i, Y_i, and N_i. Of these four variables, only two are directly controllable by an individual state in the short run. The two controllable variables are state expenditures on education, E_i, and the number of students from the state enrolling in postsecondary education, S_i. The two uncontrollable variables are the state's population, N_i, and aggregate personal income in the state, Y_i. The sizes of these two uncontrollable variables will differ among states, however.

One purpose of this proposal is to induce an individual state to change its controllable variables, S_i and E_i, in ways that strengthen the postsecondary education opportunities for its citizens. At the same time, this proposal recognizes that there are differences among the states, N_i and Y_i, that can affect a state's ability to change its controllable variables, even though these differences themselves are uncontrollable.

One controllable variable is state expenditures on education, E_i. If all other state variables and the federal policy variables are held constant, the effect of changes in this variable are given in equation (7) and are reflected in Figure 2.

$$(7) \quad \partial F_i / \partial E_i = \alpha$$

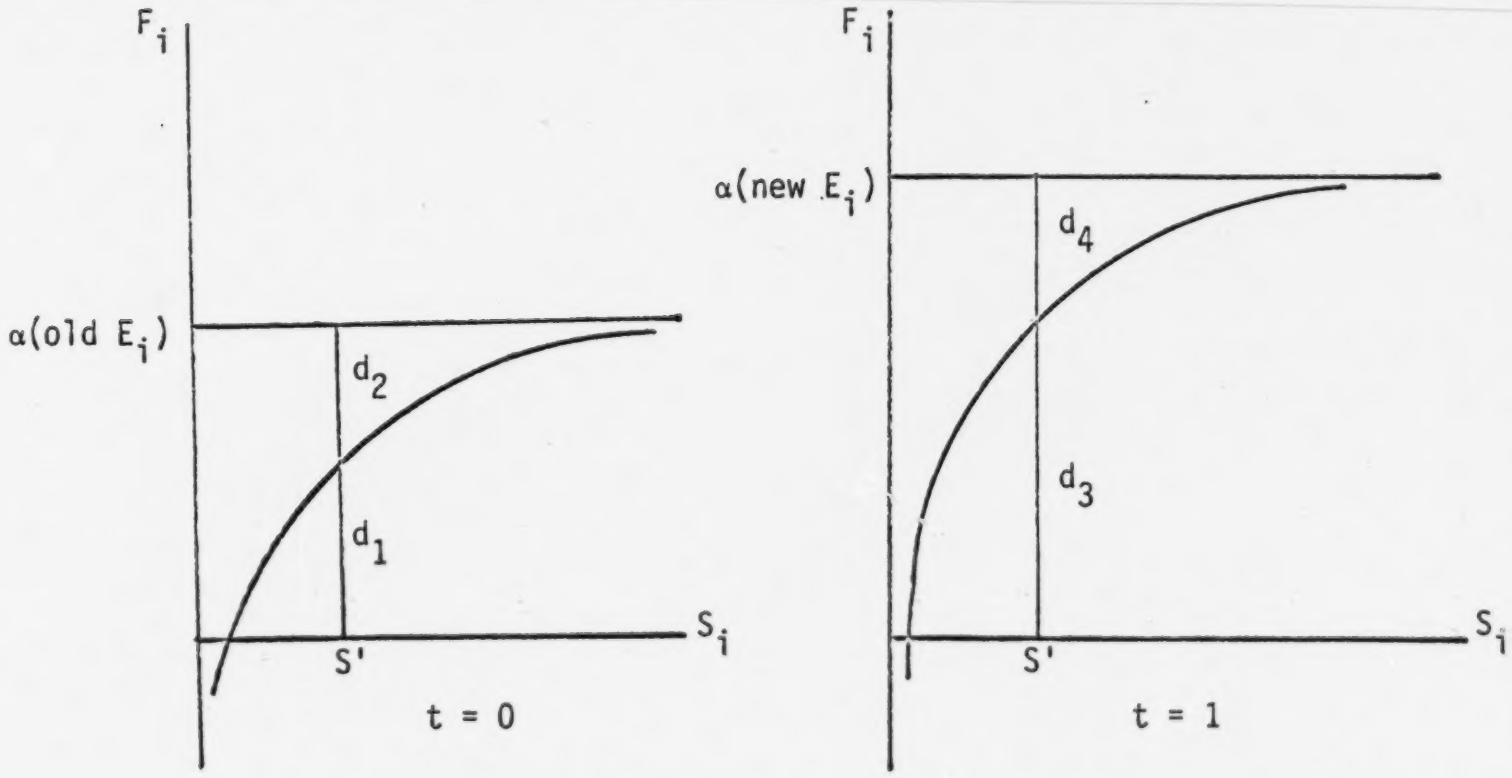

FIGURE 2: The Effect of Changes in Expenditures

Equation (7) makes it clear that increases in state expenditures for education are matched at a rate, α, where this rate is a matter of federal policy. This fact can be seen more easily by expressing (7) in the following form:

$$(8) \quad \partial F_i = \alpha \partial E_i$$

This same fact is represented in Figure 2 by having d_3 differ from d_1 by an amount equal to the difference between α(old E_i) - α(new E_i). Thus, d_2 equals d_4 in Figure 2.

Assuming that there are no changes in student enrollments in postsecondary education, an increase of X dollars in state expenditures for education will result in αX additional federal dollars being made available for Federal Student Grants in the state. This provision of the proposal thus encourages states to provide more financial support for education. It is important to realize that this is more than a dollar maintenance of effort provision. Rather than establishing just a minimum level of expenditures such as E_i° for each state, this proposal rewards states in proportion to any "extra" effort. Thus, maintenance of effort is not simply legislated but is made an automatic part of an incentive scheme tied to a state's overall effort in education.

The previous discussion has shown how a state can increase its federal support, F_i, by increasing its own support, E_i. It is clear from Equation (6) that a state can also increase F_i by increasing its enrollments in postsecondary education.* This possibility is explored in Equation (9) and Figure 3.

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*The mechanisms for a state's spending more on education appear to be quite clear. The mechanisms for increasing enrollments may require some thought because S_i is here taken to include students from the state who

$$(9)\quad \partial F_i = (I_T N_i Y_i)/S_i^2 \cdot \partial S_i$$

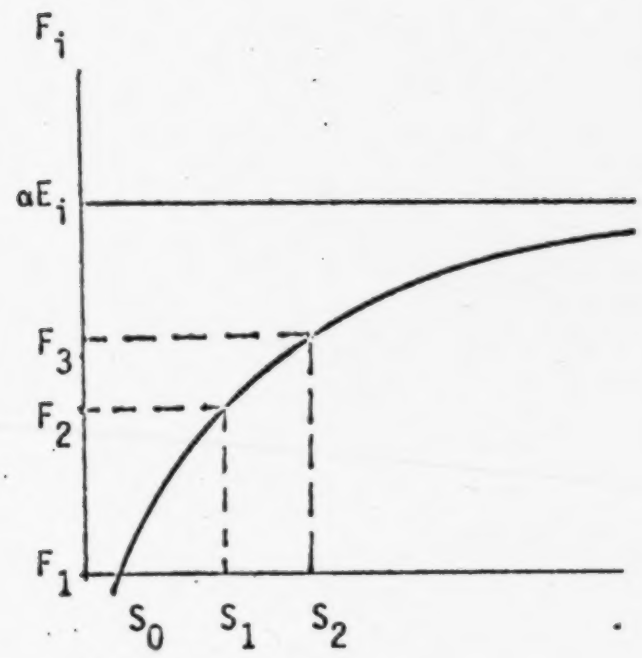

FIGURE 3: The Effect of Enrollment Increases

The fact that the right hand side of Equation (9) is positive means that additional students will bring about additional federal support. The nature and amount of this additional federal support are portrayed in Figure 3. Figure 3 reflects the fact that this proposal establishes some minimum and unique level of enrollments for each state. In other words, this proposal

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enroll both in-state and out-of-state. A state might increase its in-state enrollments by expanding its system of postsecondary education. A state might increase its out-of-state enrollments by giving students state grants to help defray their "extra" out-of-state tuition expenses. (Note: The ways in which a state might spend more on education are not so straightforward as they seem. A more advanced discussion of this point will be delayed until the two options of this proposal are considered in Part II of this paper).

allows the federal government, through its selection of α and I_T, to establish a set of minimum educational expenditures for each state, E_i^o, and a set of minimum enrollment levels, S_i^o, that each state must meet if it is to receive some federal support.

Figure 3 also reflects the fact that successive equal increases in students (e.g., S_0 to S_1 and S_1 to S_2) will result in smaller and smaller increases in federal support. In other words, $(F_3 - F_2)$ will always be less than $(F_2 - F_1)$, even when $(S_2 - S_1)$ is equal to $(S_1 - S_0)$.*

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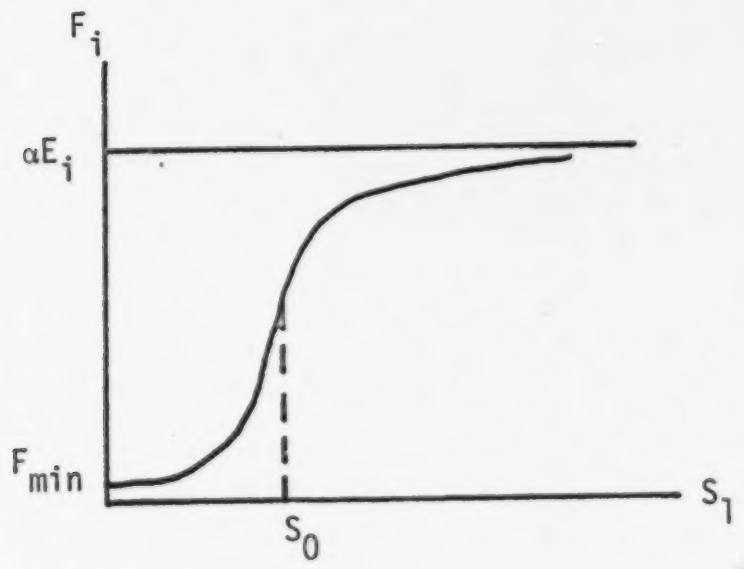
*This pattern of decreasing rate of federal support is not the only pattern that could be used. Consider, for example, the following pattern of support that could be obtained by using a Gompertz form:



In this type of pattern, as the number of students is increased, there is

Upon careful inspection, Equations (8) and (9) may be disquieting. For example, Equation (9) says that a large state or a state with a large aggregate personal income will recieve more federal support for enrollment changes than will a small state or a state with less aggregate personal income. This relationship follows from the fact that in Equation (9) larger values of N_i and Y_i will transform a given enrollment change, ∂S_i, into a larger change in federal support, ∂F_i.

This disquieting feature is easily explained. It is important to realize that large populations and large aggregate personal incomes are not synonymous with high per capita incomes. The joint term $N_i Y_i$ in Equation (9) might be large because of a relatively large population, N_i, combined with a moderate aggregate income, Y_i; or $N_i Y_i$ might be large because of a relatively high

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an increasing rate of federal support. Such a pattern of support may have two advantages over the pattern discussed in this paper. The first advantage would be that states would be given increasing federal support to move to a certain student enrollment, S_0. This enrollment level can, of course, be made to depend upon policy variables under the control of the federal government. The second advantage this form might posess is that it has F_i positive over the entire range of S_i values. This curve form would therefore guarantee that each state receive some federal support for IGS's. Note that this guarantee does not exist in Figure 3. While the form of support discussed in this footnote has several advantages, it will not be further developed in this paper. The Gompertz form, along with related forms--especially the logistic--may be the subject of a future paper.

income, Y_i, even though the population, N_i, is only of moderate size.* Only in the latter case would the state in question have a high per capita income. Hence, in Equation (9) states with larger values of N_i and Y_i should not be interpreted as necessarily referring to states with higher per capita incomes.

However, it still remains that large states and states with large aggregate incomes will experience larger increases in federal support for a given size increase in enrollments. This situation is demonstrated in Figure 4, where

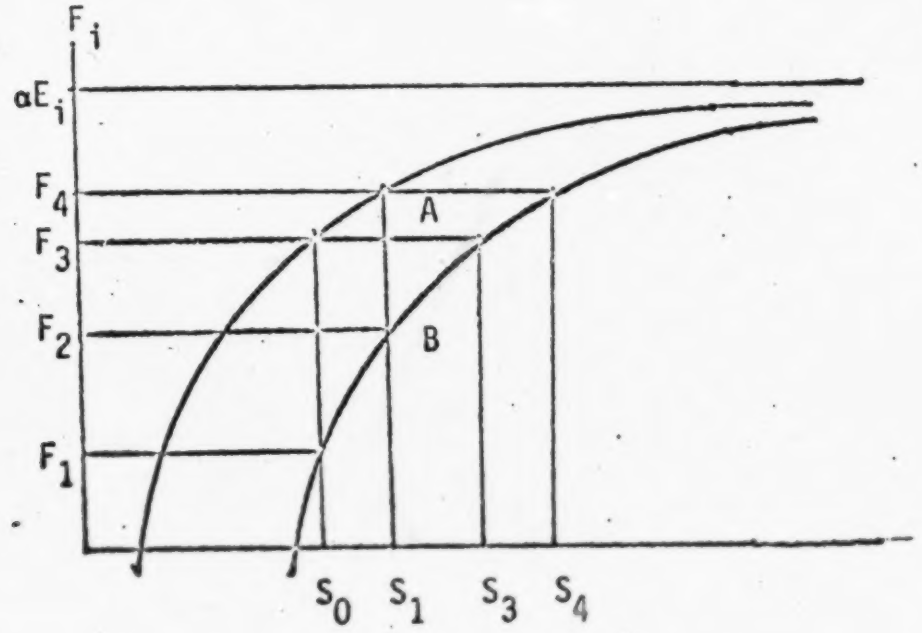

FIGURE 4: Comparison of Two States With Different Incomes and Populations

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*In the discussion that immediately follows, it will be assumed that N_i is proportionately related to the overall population of the state. This assumption is necessary in order to draw some conclusions about per capita income effects. It should be kept in mind, however, that N_i may be defined differently from the overall population of the state.

two states, A and B, have student enrollments, S_0, of the same size and spend the same amount of money on education, E_i. The two states differ, however, in their respective Y_iN_i terms. Since Equation (6) requires that $F_i = \alpha E_i - (I_T Y_i N_i)/S_i$, it is clear that State B must have a larger Y_iN_i term than State A, if federal support for State B, F_1, is less than federal support for State A, F_3 as shown in Figure 4. We now assume that both states experience an increase in enrollments from S_0 to S_1. From Figure 4 it can be seen that State B, having the larger N_iY_i term, will experience a greater increase in federal support, F_2-F_1, than will State A, F_4-F_3. But it is important to note that the absolute level of federal support is larger for State A, the state having the smaller N_iY_i term at both S_0 and at S_1. The reason for this, of course, is that State A, which has the smaller N_iY_i, is making as large an absolute dollar and enrollment effort, E_i and S_i, as is State B, even though its ability to do so in terms of Y_i and N_i is less. One way of demonstrating this fact is to note that State B would have to have an enrollment of S_3 to match the federal support of State A when State A enrolls S_0 and an enrollment of S_4 to match the federal support of State A when State A enrolls S_1. State B could also match the absolute levels of federal support of State A by increasing its expenditures rather than by increasing its enrollments. To receive the same absolute level of federal support at S_0, State B would have to increase its expenditures by an amount equal to (F_3-F_1). To qualify for the same federal support as State A at S_1, it would have to increase its expenditures by an additional F_4-F_3.

The effects of changes in Y_i and N_i have already been presented in Figure 4. Their individual effects are shown in Equations (10) and (11) and again suggested in Figure 5.

$$(10) \quad \partial F_i / \partial Y_i = - (I_T N_i)/S_i$$

$$(11) \quad \partial F_i / \partial N_i = - (I_T Y_i)/S_i$$

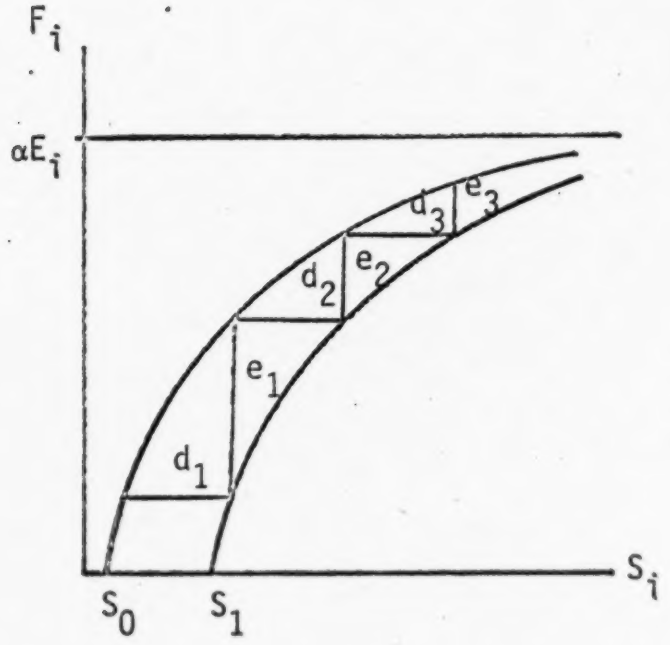

FIGURE 5: The Effect of Increases In Population or Income

The minus signs of Equations (10) and (11) clearly imply that increases in population or in aggregate income will lead to decreased federal support if S_i and E_i are held constant. An individual state that experiences an increase in aggregate income or population must increase its efforts, E_i and S_i, if

it wants to maintain its existing level of federal support. Figure 5 reflects the fact that the effect of an increase in Y_i or N_i is to shift the entire curve to the right by a constant amount, $d_1 = d_2 = d_3$.*

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*This shift is easily calculated in terms of the enrollment level at which federal support is zero, for example, from S_0 to S_1 in Figure 6. To solve for the zero federal support point, Equation (6) is set equal to zero, producing the following result:

$$F_i = 0 = \alpha E_i - (I_T Y_i N_i)/S_i$$

When this expression is solved for S_0, we get:

$$S_0 = \frac{I_T Y_i N_i}{\alpha E_i}$$

Assume now that Y_i, N_i or the joint term $Y_i N_i$, is increased by some factor, β. The above expression then can be used to solve for the new S_0 point, S_i, in the following fashion:

$$S_1 = \beta S_0 = \frac{I_T \beta (Y_i N_i)}{\alpha E_i}$$

This expression solves for the relative shift of the curve in terms of S_0. The shift of the curve in absolute terms is arrived at by noting that an increase in $Y_i N_i$ to $\beta(Y_i N_i)$ or an absolute increase of $\beta Y_i N_i - Y_i N_i = Y_i N_i = Y_i n_i(\beta-1)$ leads to an absolute shift of $S_1 - S_0 = \beta S_0 - S_0 = S_0(\beta-1)$. In summary, an absolute increase in $Y_i N_i$ of $Y_i N_i(\beta-1)$ leads to an absolute shift to the right of the F_i curve of $S_0(\beta-1)$.

In Figure 5, if $d_1 = d_2 = d_3$, then $e_1 > e_2 > e_3$. This last relationship is important because, given some increase in N_i or Y_i, it shows that a state that is already making a large enrollment effort will lose a smaller amount of federal support (e_3) than will a state that is making a smaller enrollment effort, which will instead lose (e_1).

The Federal Policy Variables

Two aspects of the federal policy variables need to be discussed. The first aspect is the separate effects of each of the individual policy variables, while the second aspect concerns their joint effects. A general understanding of the individual effects of α and I_T is possible by examining Equation (6) in a slightly modified form:

$$(12) \quad F_i = \alpha(E_i) - I_T\left(\frac{Y_i N_i}{S_i}\right)$$

Equation (12) makes it clear that α is a policy variable affecting state expenditures on education, while I_T is a policy variable affecting the joint terms ($Y_i N_i / S_i$). However, since Y_i and N_i are beyond the short-run control of individual states, the I_T policy variable can be said primarily to affect enrollment levels.*

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*It would, of course, be possible to have a separate policy variable for each term in the composite effort index, I_i. Such a modified composite index, I_i^o, might be constructed as follows:

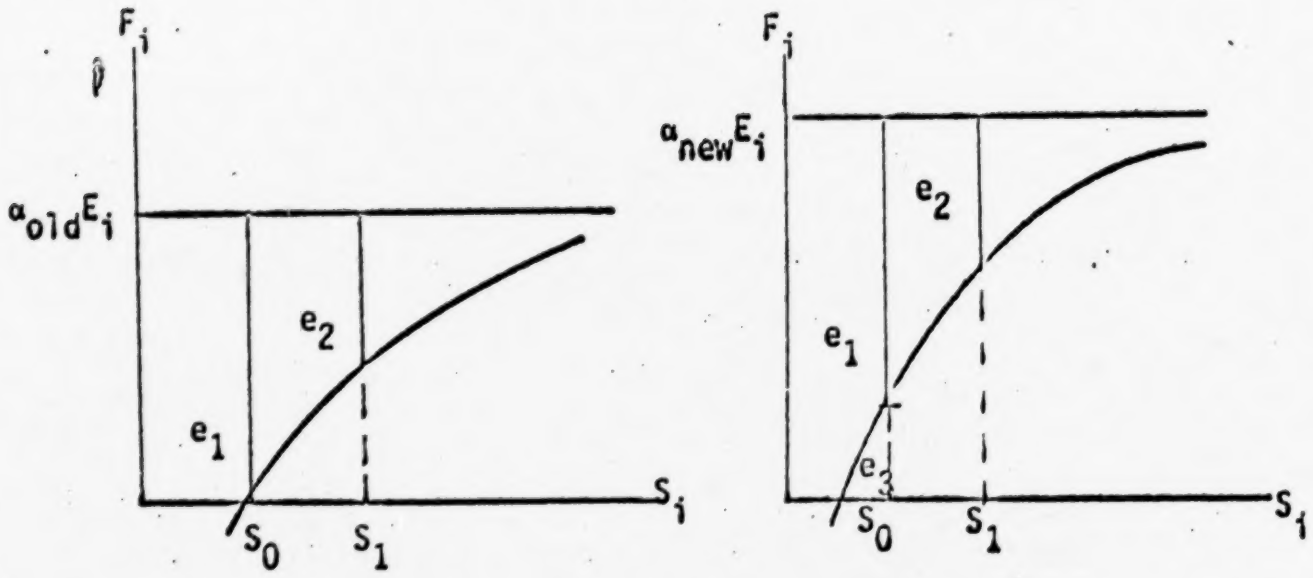

FIGURE 6: The Effect of Increasing α

The individual effect of the α policy variable is given by Equation (13) and is shown in Figure 6.

$$I_i^o = \frac{\alpha E_i}{\gamma Y_i} \cdot \frac{\xi S_i}{\rho N_i}$$

where the modifed target index would be:

$$I_T^o = \frac{\alpha E_i - F_i}{\gamma Y_i} \cdot \frac{\xi S_i}{\rho N_i}$$

with, the federal support F_i, calculated as

$$\begin{aligned} F_i &= \alpha E_i - (I_T^o \gamma Y_i \rho N_i)/\xi S_i \\ &= \alpha E_i - \frac{I_T^o \gamma \rho}{\xi} \cdot \frac{Y_i N_i}{S_i} \end{aligned}$$

This last expression is identical with earlier expressions for federal support, F_i, if the following substitution is made:

$$(13)\quad \frac{\partial F_i}{\partial \alpha} = E_i$$

In Figure 6, the increase in α, $\alpha_{new} - \alpha_{old}$, will operate to shift upward the maximum federal support for which each state will be eligible. This increase in maximum possible federal support is brought about without any increased effort on the part of the state. Thus, in this situation, states' enrollment efforts determine how far each state is from the maximum support level. Now with e_1 and e_2 remaining fixed, the federal government determines what the maximum support level will be ($\alpha_{old}\ E_i$ or $\alpha_{new}\ E_i$). In Figure 6, the effect of increasing α is to shift the F_i curve upward by an amount equal to $E_i\ (\alpha_{new} - \alpha_{old})$. Hence, in Figure 6, e_3 is equal to $E_i\ (\alpha_{new} - \alpha_{old})$. This increase in α also has the effect of making some enrollment levels eligible for federal support that previously were not eligible. For example, enrollment level S_0, which was previously not eligible for any federal support, becomes eligible for federal support when α is increased. Thus, not only is the maximum support level raised, but a state will receive a larger F_i for a given S_i, and some states with $S_i < S_0$ may become eligible. Thus the effect

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$$I_T = \frac{I_T^{o}\gamma\rho}{\xi}$$

Hence, under our proposal it is superfluous to have a separate policy variable for each term in the composite index.

of increasing α will be to: (1) increase the maximum federal support for which each state is eligible, (2) increase the federal support associated with any given enrollment, and (3) make additional enrollments eligible for support.

The individual effect of the I_T policy variable is explored in Equation (14) and in Figure 7.

$$(14) \quad \frac{\partial F_i}{\partial I_T} = - \frac{Y_i N_i}{S_i}$$

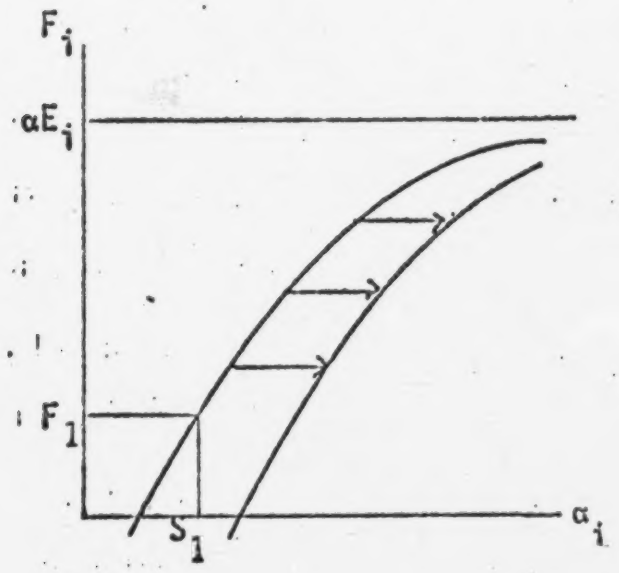

FIGURE 7: The Effect of I_T Increases

Since Equation (14) has a negative sign, this means that increased I_T values will decrease the amount of federal support that each state receives. Hence, the effect of increasing I_T is identical with increases in Y_i and N_i, namely the entire curve is shifted to the right by a constant amount. For example, in Figure 7, a state with enrollment level S_1 would have been eligible for F_1 dollars federal support. But with the increase in I_T, that support level is reduced to zero.

The individual effects of changes in α and I_T are summarized in Figure 8.

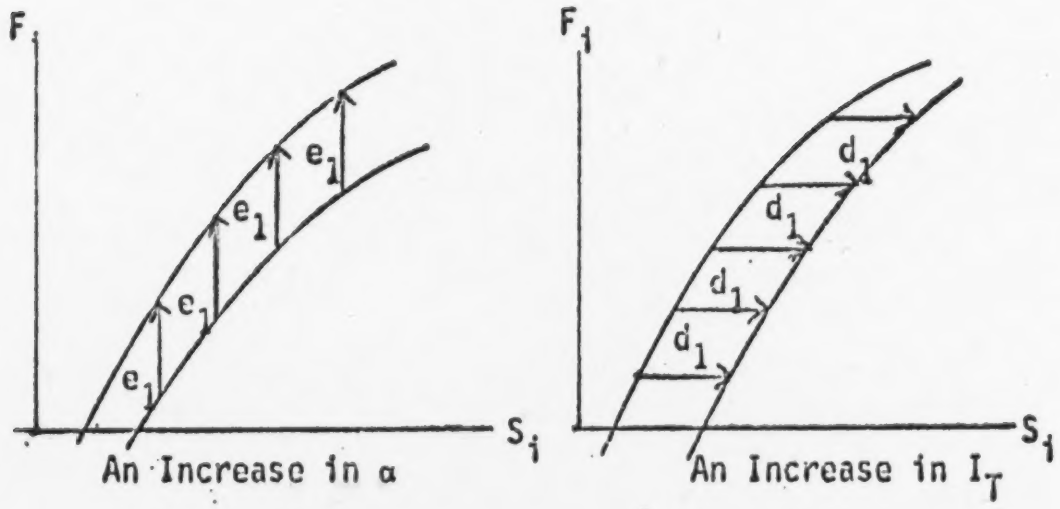

FIGURE 8: A Comparison of α and I_T Changes

Figure 8 says that an increase in α shifts the F_i curve upward by a constant amount, e_1, while an increase in I_T shifts the F_i curve to the right by a constant amount, d_1.

In view of the length of this discussion, it is probably appropriate that we summarize the major findings. We attempt this by presenting two equations. The first, Equation (15) is merely a repeat of Equation (6). It is included here to stress the fact that the absolute level of federal support depends on six variables. The second equation combines the individual effects that

changes in these six variables have upon federal support. This second equation, for the total derivative of F_i, utilizes Equations (7), (9), (10), (12), (13), and (14).*

$$(15)\quad F_i = \alpha E_i - (I_T Y_i N_i)/S_i$$

$$(16)\quad dF_i = \alpha \cdot dE_i + I_T N_i Y_i S_i^{-2} \cdot dS_i + I_T N_i S_i^{-1} \cdot dY_i + I_T Y_i S_i^{-1} \cdot dN_i + E_i \cdot d\alpha - Y_i N_i S_i^{-1} \cdot dI_T$$

Equation (16) indicates that changes in F_i for any state, dF_i, are a function of changes in six variables:

$$(17)\quad dF_i = f(dE_i, dS_i, dY_i, dN_i, d\alpha, dI_T)$$

It is interesting to consider the question of who controls the six changes that bring about increases or decreases in federal support for individual states. To simplify this discussion, we will group these changes into three categories as shown below:

---

*The total derivative for F_i can be written in symbolic form as:

$$dF_i = \frac{\partial F_i}{\partial E_i} \cdot dE_i + \frac{\partial F_i}{\partial S_i} \cdot dS_i + \frac{\partial F_i}{\partial Y_i} dY_i + \frac{\partial F_i}{\partial N_i} \cdot dN_i + \frac{\partial F_i}{\partial \alpha} \cdot d\alpha + \frac{\partial F_i}{\partial I_T} \cdot dI_T$$

Equation (16) is arrived at by substituting known values for the $\frac{\partial F_i}{\partial (u)}$ terms in the above expression.

(18) dE_i and dS_i ≡ Type I Changes

dY_i and dN_i ≡ Type II Changes

$d\alpha$ and dI_T ≡ Type III Changes

Type I Changes are basically under the control of individual states. States can control their expenditures on education and can strongly influence their enrollments by the subsidies they provide, the range of postsecondary educational opportunities they offer, and the admission procedures they implement. The federal government, on the other hand, can influence aggregate E and S figures but is heavily constrained in its influence on individual state E_i and S_i figures.

Type II Changes are the most complicated of all changes. To a large extent these changes in the aggregate incomes and populations of individual states are beyond the control of either individual states or the federal government. Both states and the federal government can influence these changes, but only indirectly.

Type III Changes are under the control of the federal government. Individual states can affect these variables only to the extent that they can influence the federal government through political processes to change α and I_T for all states.

Step Four: Calculation of the Institutional Grant per Student, IGS_i

To calcualate an IGS_i, the expression for F_i shown in equation (6) is divided by S_i, producing the following expression for the size of each student's IGS_i:

$$(19) \quad ISG_i = \frac{F_i}{S_i} = \frac{\alpha E_i}{S_i} \cdot \frac{I_T Y_i N_i}{S_i^2}$$

The size of individual grants perhaps can be better understood with the aid of Figure 9.

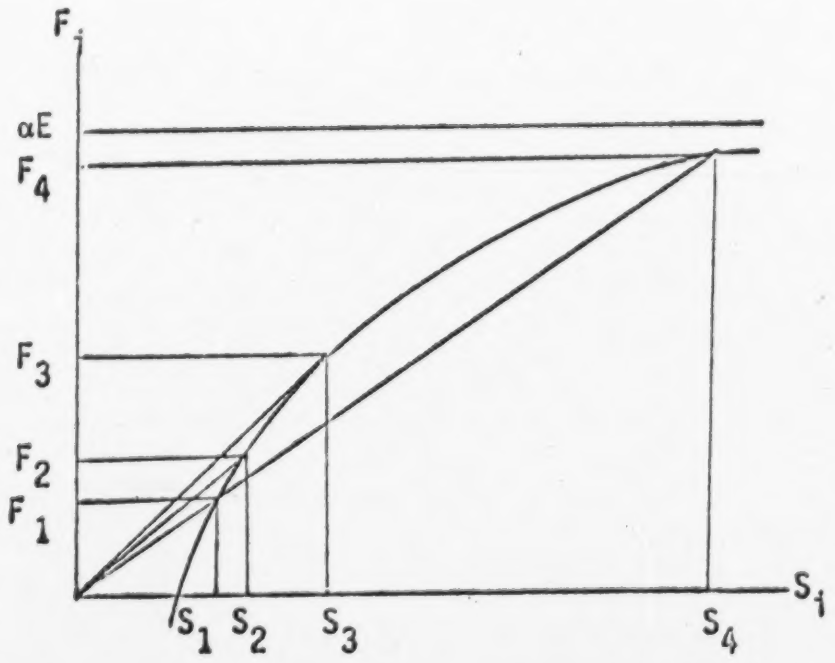

FIGURE 9: The Institutional Grant per Student

Since an Institutional Grant per Student is defined as the ratio of F_i to S_i, it is thus identical to the slope of a line from the origin to the F_i curve. Figure 9 shows that the slope of this line from the origin changes depending on which point on the F_i curve is chosen. If points on the F_i curve representing increasing F_i values are chosen, it can be seen that the slope of this Institutional Grant per Student line will rise for a while and then continuously fall. In the situation shown in Figure 9, the maximum IGS is obtained at S_3 where the resultant federal grant is F_3.* After this point, the IGS declines. Note, for example, that the IGS for an enrollment

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* The point at which the Federal Student Grant is a maximum is easily derived. It involves taking the first derivative of Equation (19) with respect to S_i, setting this derivative to zero, and then solving for S_i. These steps produce the following relationships:

$$\frac{d(FSG_i)}{dS_i} = -\frac{\alpha E_i}{S_i^2} + \frac{2I_T Y_i N_i}{S_i^3} = 0$$

$$\text{hence,} \quad \frac{\alpha E_i}{S_i^2} = \frac{2I_T Y_i N_i}{S_i^3}$$

$$\text{or,} \quad S_i^* = \frac{2I_T Y_i N_i}{\alpha E_i}$$

Where S_i^* refers to the value of S_i where the FSG is at a maximum. To prove that this point is a maximum we substitute S_i^* into the second derivative and note whether the resulting expression is positive or negative. The first

of S_4 is identical with the IGS for an enrollment of S_1. There are, of course, more students receiving IGS benefits at S_4 than at S_1 and the total federal support at S_4, F_4, is much larger than the federal support at S_1.

AN ANALYSIS OF POLICIES THAT STATES MIGHT ADOPT

It is apparent that our proposal opens up a range of policy alternatives for each state regarding the size of Federal Student Grants for its students. Three representative policies that could be adopted by states will be dis-

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step is to find the second derivative:

$$\frac{d^2(FSG_i)}{d^2S_i} = \frac{2\alpha E_i}{S_i^3} - \frac{6I_T Y_i N_i}{S_i^4}$$

$$= \frac{1}{S_i^3} \left[2\alpha E_i - \frac{6I_T Y_i N_i}{S_i} \right]$$

We now substitute S_i^* for S_i in the above expression and drop the term outside the brackets since it will always be positive. Making these substitutions and deletions, we have the expression:

$$2\alpha E_i - \frac{6I_T Y_i N_i \alpha E_i}{2I_T Y_i N_i}$$

Which reduces to:

$$2\alpha E_i - 3\alpha E_i$$

Which must, of course, be negative. Hence, S_i^* is shown to always be a maximum.

cussed: maximizing the IGS, maximizing enrollments, and establishing a target value for combined state and federal expenditures per student.

Maximizing the Institutional Grant per Student

One policy that a state might follow is to adjust its enrollments to the point where the IGS is maximized while holding state expenditures constant. The existence of this maximum point, S_i^*, has already been discussed on the preceding two pages. Under this policy, the state in question adjusts its admissions, educational offerings, and subsidies until the S_i^* point is reached.

A state cannot take the necessary actions to have enrollments stabilized at S_i^* unless there is stability in the other terms, since S_i^* changes as E_i, Y_i, N_i, α, and I_T change. The exact relationship between S_i^* and these other terms has been developed.

$$(20) \quad S_i^* = \frac{2I_T Y_i N_i}{\alpha E_i^2}$$

Equation (20) contains some counterintuitive relationships. It says that a state that increases its expenditures on education will find it necessary to reduce its enrollments if it wants to maximize the IGS. This result can be stated more precisely as:

$$(21) \quad \frac{\partial S_i^*}{\partial E_i} = -\frac{2I_T Y_i N_i}{\alpha E_i^2}$$

Where the minus sign has the implication just discussed.

Equation (20) also says that if the federal government increases its emphasis on state expenditures by increasing α, those states that have a policy of maximizing IGS's will find it necessary to reduce their enrollments. This fact is more succinctly shown by the minus sign in the following equation:

$$(22) \quad \frac{\partial S_i^*}{\partial \alpha} = - \frac{2 I_T Y_i N_i}{\alpha^2 E_i}$$

The third interesting relationship embodied in Equation (20) is:

$$(23) \quad \frac{\partial S_i^*}{\partial I_T} = \frac{2 Y_i N_i}{\alpha E_i}$$

Our previous discussion has shown that increasing values of I_T are associated with decreasing levels of federal support, F_i. Yet, Equation (23) shows that increasing I_T would require increased enrollments for those states that are maximizing IGS's.

The relationship between S_i^* and Y_i and N_i follow intuitive lines. That is, as a state's capacity to support education, Y_i and N_i, increases, it will find it appropriate to increase its enrollments, assuming, of course, that it is attempting to maximize IGS's. These relationships are implied by positive signs on the right hand sides of the following expressions:

$$(24)\quad \frac{\partial S_i^*}{\partial Y_i} = \frac{2I_T N_i}{\alpha E_i}$$

$$\frac{\partial S_i^*}{\partial N_i} = \frac{2I_T Y_i}{\alpha E_i}$$

Another observation that must be made concerning a policy of maximizing IGS's is that it may be very difficult for a state to control the S_i term, because it includes students from a state who are enrolled at public and private institutions within the state and public and private institutions outside the state. A given state's inability to control in-state private institutions, much less out-of-state institutions, public or private, may impair its ability to implement a policy of maximizing IGS's.

The benefits to a state of attempting to maximize the IGS of its students fall into two main areas. First, students from that state will benefit from the largest possible IGS that can be achieved given current expenditures. This result will maximize the desirability of these students to postsecondary institutions and thus may be reflected in preferential admission and tuition treatment for these students. The second benefit to a state in trying to maximize the IGS results because most of its students will probably attend in-state institutions, and therefore will bring general assistance dollars in the form of IGS's to these institutions. Since each student's IGS has been maximized, it will cover a greater amount of marginal costs associated with his enrollment than if the IGS has not been maximized.

While there may be these benefits to a state in implementing a policy of maximizing IGS's, there may also be some drawbacks. The first obvious drawback is that it may be necessary for a state to curtail enrollments if it wishes to reach the enrollment level at which the IGS is maximized. Second, if students receive the largest possible IGS, the likelihood that they will attend private or out-of-state public institutions increases.

In summary, a state strategy that attempts to maximize IGS's is not likely to be appropriate. We believe this because (1) a state with fixed state expenditures might have to restrict enrollments in order to maximize IGS's, and (2) it would be necessary for a state that increases its expenditures on education to decrease its enrollments simultaneously in order to maximize IGS's.

Maximizing Enrollments

Assume a state attempts to hold its expenditures on education constant while simultaneously attempting to maximize its enrollments. This policy will, of course, increase F_i, the federal support. To see this it is necessary only to look at Equation (6) where $F_i = \alpha E_i - (I_T Y_i N_i)/S_i$. F_i will be at a maximum when the second term is driven to zero, and the way to do this is to make enrollments, S_i, as large as possible. The major advantage of this policy is that it attempts to make postsecondary education opportunities available to as many people as possible.

Figure 10 will be useful in discussing the possible implications of this policy.

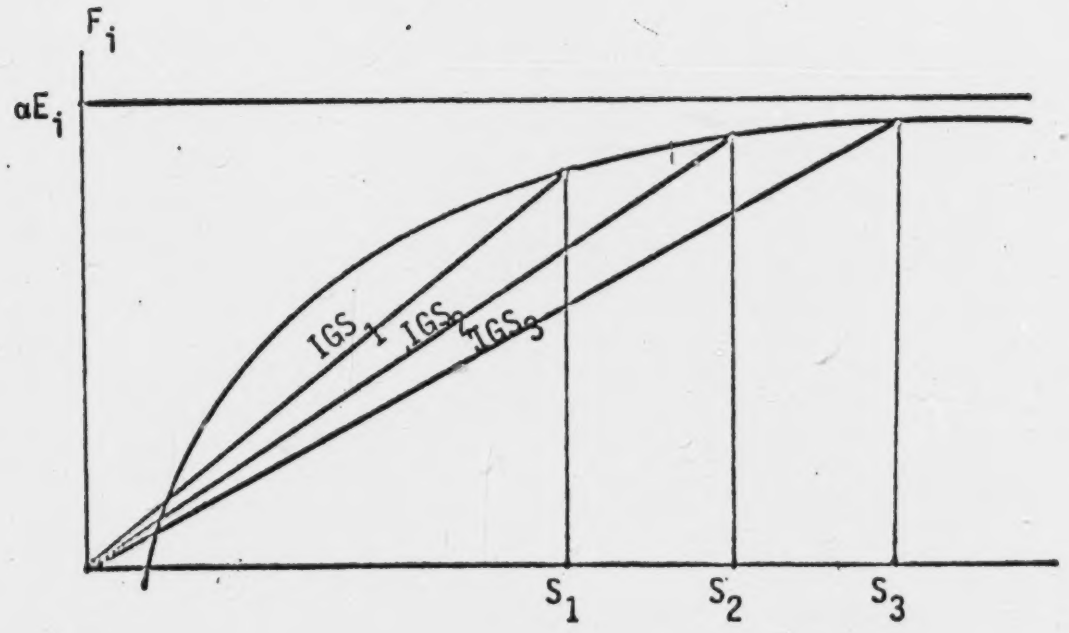

FIGURE 10: Effect of Enrollment Increases on IGS's

Based on Equation (6) Figure 10 is constructed so that after enrollment level S_1 is reached, the level of federal support, F_i, becomes almost a constant. Even large enrollment increases after this point will not bring forth significant increases in F_i. Yet, a policy of maximizing F_i would require a state to try to reach higher and higher enrollment levels such as S_2 and S_3.

Figure 10 reflects the fact that the major effect accompanying enrollment increases after S_1 is reached is not the increase in federal support but rather decreases in the size of the Institutional Grant per Student.

Establishing Target Values for Combined State and Federal Spending per Student

Assume a state decides that combined state and federal expenditures per student are to be held to a specific level. This policy can be expressed as:

$$(25)\quad \frac{E_t + F_t}{S_t} = K_t$$

Where t is the budget period being considered and t = 0 refers to the budget period just previous to the implementation of our proposal.

To simplify the discussion we will assume that enrollments remain the same from year to year so that $S_t = S_0$. If we further assume that a state is satisfied with a constant year to year K_t, it follows that the policy reflected in Equation (25) will lead in a particular state to an equilibrium level for both state and federal expenditures given by the following equation:

$$(26)\quad \frac{E_e + F_e}{S} = K$$

The equilibrium level of state expenditures now equals:*

$$(27)\quad E_e = \frac{KS + I_T YNS^{-1}}{1 + \alpha}$$

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*To derive equilibrium state expenditures, Equations (6) and (25) are expressed in slightly different form as:

$$(a)\quad F_{t+1} = \alpha E_t - I_T YNS_t^{-1}$$

$$(b)\quad \frac{E_{t+1} + F_{t+1}}{S_{t+1}} = K_t$$

Now assume that $K_t = K_{t-1} = K_o$ and that this leads to $S_t = S_o$. With these

Equation (27) can then be combined with Equation (26) to solve for the equilibrium level of federal expenditures:

$$(28)\quad F_e = \frac{\alpha KS + I_T YNS^{-1}}{1 + \alpha}$$

Equation (27) is interesting because it does not explicitly contain a term for what state expenditures were before the implementation of our proposal. The level of state expenditures just previous to the implementation of our proposal will be referred to as E_o. Hence, depending on the average expenditures per student figure, K, and the initial level of state expenditures, it is entirely possible that $E_e > E_o$.

If we know the relationship between K and E_o, it will be possible to solve for the equilibrium level of state expenditures in terms of the initial level of expenditures. Such a special relationship will be explored in the remainder of this section. Great care must be taken, however, to avoid applying any of the conclusions that follow from this special relationship to the general case given in Equation (28).

---

simplifications, substituting (a) into (b) yields:

$$(c)\quad \frac{E_{t+1} + \alpha E_t - I_T YNS^{-1}}{S} = K$$

At equilibrium $E_{t+1} = E_t = E_e$. Hence Equation (c) can be rearranged to yield E_e.

$$(d)\quad E_e = \frac{KS + I_T YNS^{-1}}{1 + \alpha}$$

Assume that a state before the implementation of our proposal is spending a certain number of dollars per student, K_o, where this amount does not contain any federal dollars. Expenditures per student, K_o, are therefore equal to:

$$(29) \quad K_o = \frac{E_o}{S}$$

Now suppose that a state decides to spend only enough so that combined state and federal expenditures per student equal K_o. In other words, a state has embarked on a policy that has resulted in a modification of Equation (26) to:

$$(30) \quad \frac{E_e + F_e}{S} = K_o$$

The equilibrium level of state expenditures is seen to be:

$$(31) \quad E_e = \frac{E_o + I_T Y N S^{-1}}{1 + \alpha}$$

This equation is derived by substituting the K_o of Equation (29) for K of Equation (27), thus obtaining Equation (31). If Equation (31) is divided by E_o:

$$(32) \quad \frac{E_e}{E_o} = \frac{1 + I_T Y N E_o^{-1} S^{-1}}{1 + \alpha}$$

We can investigate forcing $\frac{E_e}{E_e} > 1$. This would mean that each state will be spending more than it is now spending, and it can be shown that I_T must be greater than I_i for this to be possible, or $I_T > I_i$.*

---

*Note in Equation (32):

Under this policy being discussed, we have already noted that by setting $I_T \geq I_i$, State i will not receive any federal support. The only way it can be insured that no state is able to reduce its current expenditures is to set $I_T > I_{maximum}$, where $I_{maximum}$ is highest composite effort index observed for any of the fifty states. Under this condition, no state could cut back on its level of state support by substituting federal dollars for state dollars because every state would have to <u>increase</u> its efforts before it even qualified for federal support. The only "advantage" of this approach is that states with high I_i values would be able to reach I_T more quickly than states with low I_i values.

$\frac{E_e}{E_o}$ is of the form $\frac{1 + X_1}{1 + X_2}$

Now if we want $\frac{E_e}{E_o}$ to be greater than 1 it will be necessary to have:

$$\frac{X_1}{X_2} > 1 \text{ or } \frac{I_T Y N E_o^{-1} S^{-1}}{\alpha} > 1$$

Which means that:

$$\frac{I_T}{\alpha} > \frac{E_o S}{YN}$$

This expression shows the necessary relationship between I_T and α if $E_e > E_o$. If α is moved to the right hand side of this expression:

$$I_T > \frac{\alpha E_o S}{YN}$$

This expression is identical with:

$$I_T > I_i$$

We believe that setting $I_T > I_{maximum}$ is not an appropriate policy for the federal government to adopt. To set $I_T > I_{maximum}$ insures that no immediate general assistance becomes available to any institution and that both high effort and low effort states will not receive any federal support.

We consequently argue that I_T should be set below $I_{maximum}$ and very probably even below the minimum composite effort observed among the fifty states, $I_{minimum}$. This policy will insure that an institution receives some general assistance for every student enrolled, that states are differentially recognized for their efforts, and that every student will benefit from an IGS. However, we are well aware that this I_T recommendation makes it possible, given a state policy of constant expenditure per student, for any state to reduce equilibrium expenditures below current expenditures.

The following example should help to clarify the process by which federal dollars are substituted for state dollars.

Example 1

Let: $E_o = 4000$

$Y = 50{,}000$

$S = 2$

$N = 5$

$\alpha = .6$

$I_T = .01$

Where: $F_{t+1} = \alpha E_t - I_T YNS^{-1}$

$F_{t+1} + E_{t+1} = E_o$

t	E_t	F_{t+1}	E_{t+1}	$E_{t+1}-E_t$
0	$4000	$1150	$2850	-$1150
1	2850	460	3540	+ 690
2	3540	874	3126	- 414
3	3126	626	3374	+ 248
4	3374	774	3226	- 148
5	3226	686	3314	+ 88
6	3314	738	3262	- 52
7	3262	707	3293	+ 31
8	3293	726	3274	- 19
9	3274	714	3286	+ 12
10	3286	722	3278	- 8

Example 1 shows that the equilibrium level of expenditures is not arrived at even after ten time periods have passed, although equilibrium is approaching. Using Equation (31) we can see that the equilibrium level of state expenditures will be reached at E_e = $3281. This figure, of course, is between the last two E_t figures of $3274 and $3286 as shown in Example 1. Hence, when

equilibrium is finally reached, the state will have reduced its expenditures from $4000 to $3281, and the Federal government will have increased its expenditures from zero dollars to $719. While Example 1 shows how equilibrium can be approached over a period of time, it would of course be possible for a state to use Equation (31) and move in a single time period to its equilibrium level of expenditures. This substitution of federal dollars for state dollars is shown graphically in Figure 11.

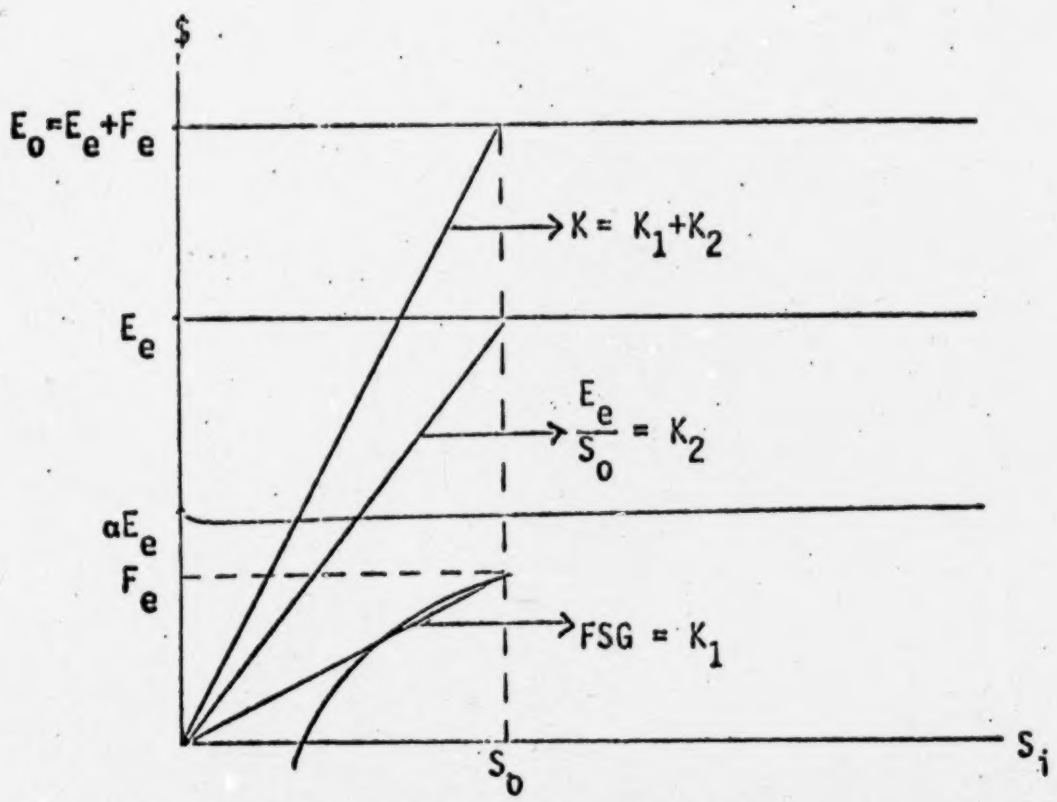

FIGURE 11: Equilibrium Levels of State and Federal Expenditures

The only portions of Figure 11 that remain unchanged from time zero are: the total expenditures on students, the $E_o = E_e + F_e$ line; the enrollment level, S_o; and the total expenditures per student, K. As demonstrated in

Example 1, state and federal expenditures may fluctuate about their respective equilibrium levels, with the magnitude of these fluctuations decreasing over time. Figure 11 shows that these fluctuations can be avoided if a state reduces its spending in one time period from E_o to E_e. At equilibrium, then, the federal expenditures per student, IGS, and the state expenditures per student, E_{e/S_o}, will be such that the desired level of expenditures per student, K, will be achieved. Furthermore, there will be no incentive on the part of either the state or the federal government, given existing policies and policy variables, to deviate from this equilibrium situation.

We have shown that a state adopting a policy of maintaining the present level of expenditures per student can accomplish this by substituting some federal dollars for state dollars. The only states that cannot adopt this policy are those whose composite effort index, I_i, is less than the target effort index, I_T. But we have argued that I_T should be set below $I_{minimum}$ for a variety of reasons. This means that each state wishing to adopt this policy can substitute some federal dollars for state dollars. But only states that want to do less and whose constituency will let them make a smaller dollar effort in the face of federal incentives and rewards for doing more will adopt this policy. In any plan that provides an <u>incentive</u> for maintenance of effort, even if this is a strong incentive, it is possible by definition for some state(s) to ignore the incentive. The only way to insure absolute maintenance of effort is to legislate it.

If it is impossible to force states to maintain their present level of state expenditures, then it must also be impossible to force them to maintain their present composite effort index. Even if all the other terms of I_i remain constant and the expenditure term falls to E_e, the new equilibrium composite effort index, I_e, will be less than I_i.

If I_e is less than I_i, two questions must be answered. The first question is whether I_e is independent of I_i. In other words, if I_i falls to I_e, does the final equilibrium effort, I_e, depend in any way on the initial effort that led originally to I_i? The second question concerns the relationship between I_e and I_T. The question is whether I_i will fall to I_T so that I_e will thus equal I_T for all states adopting this policy. It is obvious that these questions are related. For example, if I_e falls to I_T, then clearly I_e is independent of I_i.

Fortunately it is possible to show the relationship between I_i, I_e, and I_T in a single Equation.*

$$(33) \quad I_e = \left(\frac{1}{1+\alpha}\right) I_i + \left(\frac{\alpha}{1+\alpha}\right) I_T$$

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*We first define I_e as:

$$(a) \quad I_e = \frac{\alpha E_e}{Y} \cdot \frac{S}{N}$$

Next, we recall from Equation (31) that E_e is equal to:

The α of Equation (33) is the previously described federal policy parameter applied to state expenditures. In Equation (33) it is important to note that:

$$(34)\quad \frac{1}{1+\alpha} + \frac{\alpha}{1+\alpha} = 1 \text{ for } \alpha \text{ non-negative}$$

Equation (34) states that the coefficients of I_i and I_T in Equation (33) are weights that sum to one. If more weight is placed on I_i, less weight is automatically placed on I_T. If α is set equal to zero, then I_e will equal I_i. If α is set equal to infinity, then I_e will equal I_T. If α is chosen intermediate between these values, then I_e will be the weighted average of I_i and I_T.

With Equation (33) it is now possible to formulate answers to our earlier questions about I_e. The first question was concerned with the relationship between I_i and I_e. As is clear from Equation (33), if α and I_T are fixed, I_e will be larger for a state with a higher initial effort than it will be for a state with a lower initial effort. This might be expressed more pre-

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$$(b)\quad E_e = \frac{E_o + I_T YNS^{-1}}{1 + \alpha}$$

Substituting (b) into (a) we can then write that:

$$(c)\quad I_e = \frac{1}{1+\alpha}\left(\frac{\alpha E_o S}{YN}\right) + \frac{\alpha}{1+\alpha}\left(I_T\right)$$

Since $I_i = \frac{\alpha E_o S}{YN}$ we can rewrite (c) as:

$$(d)\quad I_e = \frac{1}{1+\alpha}\left(I_i\right) + \frac{\alpha}{1+\alpha}\left(I_T\right)$$

cisely as:

$$(35)\quad \frac{\partial I_e}{\partial I_i} = \frac{1}{1+\alpha}$$

Since the partial derivative of I_e with respect of I_i is positive, this means that higher I_i values are associated with higher I_e values. This relationship is explored in the following example:

Example 2

State A	State B
Let E_A = 4,000	Let E_B = 4,500
Y_A = 50,000	Y_B = 63,000
S_A = 2	S_B = 3
N_A = 5	N_B = 9
K_A = 2,000	K_B = 1,500
α = .600	α = .6
I_T = .010	I_T = .010
Then I_A = .019	I_B = .014
Ee_A = 3281	Ee_B = 3994
Ie_A = .016	Ie_B = .013

In Example 2, State A is initially making a larger composite effort than is State B, .019 versus .014. Furthermore, as suggested by Equation (35), this ordering of effort is preserved at equilibrium. In equilibrium, State A is still making a greater effort than is State B, .016 versus .013.

The second question that can now be answered is the relationship between I_i and I_T. As has already been noted, I_i could fall to I_T only if α is set at a plus infinity. Hence, only in this case would I_e be independent of I_i. Since in the Example 2, α is set at .6, I_i does not fall to I_T for either State A or State B.

In Example 2 it is interesting to note that the selection of an α value of .6 means that a weight of .625 has been placed on the initial level of effort and a weight of .375 has been placed on the target level of effort. These weights are derived from the respective coefficients for I_i and I_T in Equation (34). As pointed out in Equation (34), these weights sum to one. If more emphasis had been placed on the initial level of effort, then the equilibrium levels in Example 2 would be higher for both State A and State B.

A short review of a state policy in setting a target value for combined state and federal expenditures per student, K, is in order. If a state adopts a target K that is equal to its present expenditures per student, then that state will be able to reduce its dollar support of postsecondary education. This reduction in dollar support will depend upon both its current composite

effort and the value of the federal policy variables α and I_T. In general, however, a state that is currently making a large effort relative to the other states will still be required in equilibrium to make a large effort relative to the other states. Hence, while absolute dollar effort is not preserved for those states that adopt this version of K, at least their current rank order of effort is maintained.

If a state adopts a K value higher than its present expenditures per student, it may or may not be able to reduce its present level of expenditures, E_o. The value of K that will result in equilibrium expenditures, E_e, equaling initial expenditures, E_o, is calculated as:

$$(36) \quad K^o = \frac{(1+\alpha)E_o}{S} - \frac{I_T YN}{S^2}$$

This expression is derived using Equation (27), which solves for E_e when K can be any value and the desired relationship that equilibrium expenditures, E_e, equal initial expenditures, E_o. Hence, we set $E_o = E_e$ and solve the resulting expression for K^o. The result of this effort is shown in Equation (36) above. If K is set above K^o, then E_e will be greater than E_o. If K is set below K^o, then E_e will be less than K^o. Hence, the only situations in which maintenance of initial dollar effort is not preserved are those situations in which a state establishes a K value that is less than K^o. The K^o values for Example 2 are K_A^o = \$2575 for State A (versus K_A = \$2000 currently) and K_B^o = \$1770 for State B (versus K_B = \$1500 currently). For example, if

State A establishes a goal that aggregate spending shall be $2575 per student in equilibrium, then its level of equilibrium expenditures will be the same as its current expenditures, namely $4000.

A SUMMARY OF OUR PROPOSAL

We have discussed in some detail a four-step approach to describing our proposal. A more concise representation of our proposal is shown in Figure 12.

The important information missing from Figure 12 concerns the many policies that states might adopt regarding state expenditures and state enrollments. We have discussed three possible state policies. Each was shown to have strong and weak points. These policies were (1) maximizing IGS's, (2) maximizing enrollments, and (3) setting a target value for combined state and federal expenditures per student.

Date & Policy Variable Inputs

Total Federal Dollar & Institutional Grant per Student Calculations

Direct Federal Disbursement to Institutions

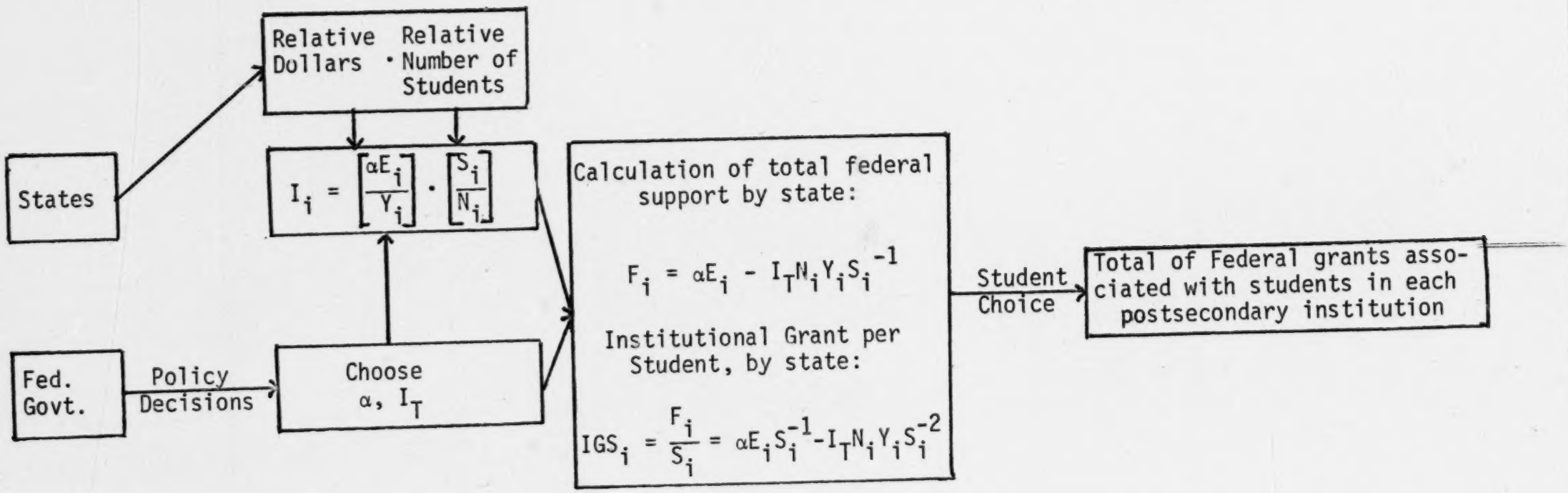
Relative Dollars
Relative Number of Students
States
$I_i = \left[\frac{\alpha E_i}{Y_i}\right] \cdot \left[\frac{S_i}{N_i}\right]$
Calculation of total federal support by state:
$F_i = \alpha E_i - I_T N_i Y_i S_i^{-1}$
Institutional Grant per Student, by state:
$IGS_i = \frac{F_i}{S_i} = \alpha E_i S_i^{-1} - I_T N_i Y_i S_i^{-2}$
Fed. Govt.
Policy Decisions
Choose α, I_T
Student Choice
Total of Federal grants associated with students in each postsecondary institution

Figure 12: Mechanisms for Calculating and Disbursing General Institutional Assistance under This Federal Financing Plan

A policy of maximizing IGS's has strength in that each student benefits from the maximum possible federal support for his education. A disadvantage of this policy is that it may involve enrollment restrictions. This policy also assumes that state expenditures are fixed and hence independent of enrollments.

A policy of maximizing enrollments has the advantage that it uses the incentive of federal support to extend postsecondary education to as many students as possible. The disadvantages of this policy include possible decreases in the quality of students and the increased probability, as compared to the policy of maximizing IGSs, that a student will be forced to attend an in-state public institution.

A policy of setting a target for combined spending per student (state plus federal) has the advantage that the federal subsidy per student question is addressed directly. It assumes that the subsidy required per student is known and that state and federal governments will work to achieve this level of spending. The disadvantage of this policy is that it may permit some states to set lower expenditures per student, K, and hence reduce dollar support to higher education from current support levels. While the possibility that certain states may be able to reduce their expenditures is a serious drawback of this policy, it should be noted that the student is not hurt by this policy. The federal contribution is such that expenditures per student remain constant. Hence, one way to view this situation is to say that the federal government steps in to help students in those states that no longer are willing to maintain their commitment to postsecondary education.

None of these policies is likely to be optimal for all states. A state is likely to choose that policy which is politically feasible for a particular time period. Another policy may be feasible for another time period. The important point is that this proposal permits states the freedom and flexibility to adopt different policies. Thus direct federal intervention in state affairs is kept to a minimum.

EFFECTS OF OUR PROPOSAL

Before moving on to Part II of this paper, where we discuss some alternative definitions for E_i and S_i, it will be well to review what we believe to be the major effects of our basic proposal on the groups most concerned with postsecondary education. Four groups will be considered--students, institutions, the states, and the federal government.

There are several ways in which we believe students will benefit from our proposal. First, they will benefit from the additional efforts that many states and the federal government will make toward education. States that are deeply committed to postsecondary education have an incentive not only to maintain their dollar and enrollment efforts, but also to increase them. Furthermore, since state efforts are measured on a relative basis, students from poor and less populous states have as great a chance of benefiting from state efforts as do students from rich and populous states. Students will also be the beneficiaries of federal assistance in a form that is entirely

new. This new form means that additional federal dollars will flow directly to institutions, and it should lead to improvements in programs, facilities, etc., that will benefit students.

Students may benefit from partial "rebates" of the grants that institutions receive as a result of their enrollment. Since students from different states will have different IGS's, it will be to an institution's advantage to attract students with the largest possible IGS's. If an institution is forced to "rebate" part of the IGS in order to attract high IGS's, it may still be a better position financially than if it attracted students with low IGS's and did not rebate. The federal government could, of course, step in and establish a policy requiring that so much of each student's IGS be applied against this tuition. We are not suggesting this approach because we believe the "market" will lead to more innovative solutions that might be better than this obvious solution. After experience is gained with this program, the federal government may choose to adopt several of these "market" solutions as a matter of federal policy. Under any of these solutions, we believe that the end result will be differential tuition policies for students from particular states. A model for this kind of tuition policy already exists in the differential tuitions that public institutions now charge on the basis of whether a student is in-state or out-of-state. Our proposal would broaden the out-of-state classification from one category to forty-nine categories. Further, it would then extend this differential tuition approach to private instituions where it is not now in force.

Some of the ways in which institutions would benefit by our proposal have already been mentioned. These benefits would include the availability of unrestricted money, the opportunity to address an extended national market for students, and the chance to experiment with novel admission and tuition policies. Another way in which public institutions would benefit is by the incentives that the federal government offers to states to maintain and to even increase a state's efforts in education.

States will benefit from our proposal in several ways. First, they will benefit from the general institutional aid dollars that will flow from the federal government to public institutions. This means that states have the option to offer more and better public education without having to foot the entire bill. In a very real sense, state educational dollars become leveraged by our proposal because for every additional dollar of state money spent on education, more than one dollar overall is spent on education.

States will also benefit by having increased educational opportunities made available to their students. If a state makes a concerted effort on education and thus produces large IGS's for its students, it will find that its students are welcomed by many institutions in many states. This means that a state could limit its educational opportunities to specialized fields without hindering those state students whose needs are different.

States also benefit from this proposal because educational effort is measured in relative rather than absolute terms. Hence it can be accurately said that a state is not competing directly with other states under our proposal. Since each state will differ in aggregate income and in population, no one state will be compared directly with another state. Rather a state will be measured continuously against its own capacity. Furthermore, the state has two variables under its control, expenditures and enrollments; thus, not even the exact form of effort is specified. Even if two states are quite similar in population and aggregate income, they both could make comparable efforts while embarking on dissimilar expenditure and enrollment patterns. This possibility further weakens the direct competition aspects of our proposal and insures that the special situations of each state are recognized.

The federal government, like other groups, receives benefits in various unique ways from this proposal. First, by basing the level of overall federal support on relative educational efforts by states, it is provided with a logical and consistent rationale for treating states differently. Relative educational effort, rather than political expediency, is the basis for determining federal support levels. Secondly, the federal government is not put in the position of establishing levels of financial need or solving the problems of "financial crisis" at each of 2,500 institutions. Neither is it forced to support a system that favors either public or private institutions; it is not forced to decide what kinds of programs are needed or what kinds of institutional activities are weak. Rather, these decisions are made by individual institutions using their own special circumstances and student "demand" as reference points.

Finally, the federal government benefits from this proposal by having separate policy variables to control the overall sensitivity of federal support to expenditure and enrollment changes. These two policy variables should make possible a wider range of federal support possibilities and hence make federal support more responsive to educational needs and more influential in encouraging an expansion of educational opportunities.

Part II

OPTIONS

AN OVERVIEW

To this point, our definitions for the expenditure term, E_i, and the population term, N_i, have been very general. E_i has been defined as "annual state expenditures for education in State i," and N_i has been defined as "the population of the ith state from which the S_i students are drawn." For purposes of our paper, we will not discuss alternative definitions of the remaining terms, Y_i and S_i. Quite clearly there are several alternative ways in which both aggregate income and students could be defined. Among the income considerations are such things as whether to use personal income or disposable personal income. Among the student considerations are the possibilities of using headcount or a suitably defined full-time equivalent count. While these issues are not without impact on our proposal, we believe that their impact is substantially less than the potential impact of alternative E_i and N_i definitions.

The definition of E_i prompts three major difficulties. First, the meaning of "state" is not clear. Does this term refer to a state government, to all governments within a state, or to the people of a state? Secondly, the word "expenditures" needs a precise definition. For example, does it include operating and capital expenditures; does it include funds spent by one level

of government coming from another level of government; does it include money spent by a state's students attending institutions located outside the state? Finally, the meaning of the word "education" is almost unlimited. There are several levels of education--primary, secondary, and postsecondary; several types of education--academic, vocational, and professional; and several types of governance schemes--public, nonsecular private and secular private.

Fewer difficulties arise with the N_i term, but significant issues are involved. The most basic issue is whether N_i should be defined to include all people in the population who are of a "postsecondary education age," or whether it should be defined to include all people who will eventually become eligible for postsecondary education, or whether it should be defined as the total population. As examples, the "postsecondary" group might be defined as consisting of all people in a state between ages eighteen and thirty years. Or the "become eligible" group might comprise all people between five and seventeen years of age. While the analogy is not perfect, the "postsecondary age group" concept puts stress on the <u>stock</u> of people that might avail themselves of a postsecondary education. The "become eligible age groups" concept puts stress on the <u>flow</u> of people into postsecondary education.

While it might appear at first that the population should be defined as constituting all residents of a state, we believe that this approach is unattractive. First, it must be recognized that there are differences in the distributions of ages among states. Some states have a relatively large proportion of their people in the higher age brackets while other states

have an unusually high proportion of their population in the lower age groups. Quite clearly, the likelihood of people from various age groups ever attending college differs by age groups. Since this is so, it would be unfair to weight all people equally, no matter what their age group, in defining the population for postsecondary education.

Since there are many possibile definitions of E_i and N_i, it follows that there are many combinations of E_i and N_i that might be considered. In this paper we will discuss only two combinations. We justify this selectivity by a belief that the two combinations chosen are the combinations most complementary to the basic proposal discussed in Part I. The two combinations under consideration will be called the Postsecondary Expenditures option and the Elementary-Secondary Expenditures option. These options will hereafter be referred to as the PSE and the ESE options. We begin with a discussion of the PSE option because we believe that most readers will find it the more "obvious extension" of our basic proposal.

THE POSTSECONDARY EXPENDITURES OPTION (PSE)

The first perspective that must be established is what constitutes a state. For purposes of our proposal, we will consider a state to consist of the citizens of that state. It is their expenditures on education, their aggregate income, their enrollments in education, and their numbers that are used to construct a composite effort index toward education. It is

important to realize that this perspective immediately excludes other perspectives such as a state, simply consisting of various levels of government within the state.

Having defined a state to be its citizens, it follows that the E_i term should measure their expenditures on education. More precisely, for the PSE option it will be important to measure how much money is spent, directly or indirectly, on postsecondary education by the citizens of the state. Note that this option stresses the origin of funds (they must be from the citizens of a state) and the uses of funds (they must be for postsecondary education), but it does not stress the destination of the funds (they can be spent in any state at either a public or a private institution). We will not try to distinguish between operating and capital expenditures. Both our basic proposal and the two options are consistent with several combinations of these two types of expenditures. We believe that, as a minimum, operating expenditures must be included. We also believe that it would be more equitable to states that are committed to education if we included capital expenditures. The only restriction we would impose on capital expenditures is a restriction that a multiyear moving average be used. This restriction would dampen year-to-year fluctuations in federal support that would follow.

People spend money, directly or indirectly, on education in at least three major ways: (1) by gifts given directly to institutions whether the institutions are public or private, in-state or out-of-state; (2) by tuition and fees paid directly to institutions, again where institutions are not restricted to

in-state public institutions; (3) and by taxes that form the basis for governmental appropriations to institutions within a state. These are shown schematically in Figure 13.

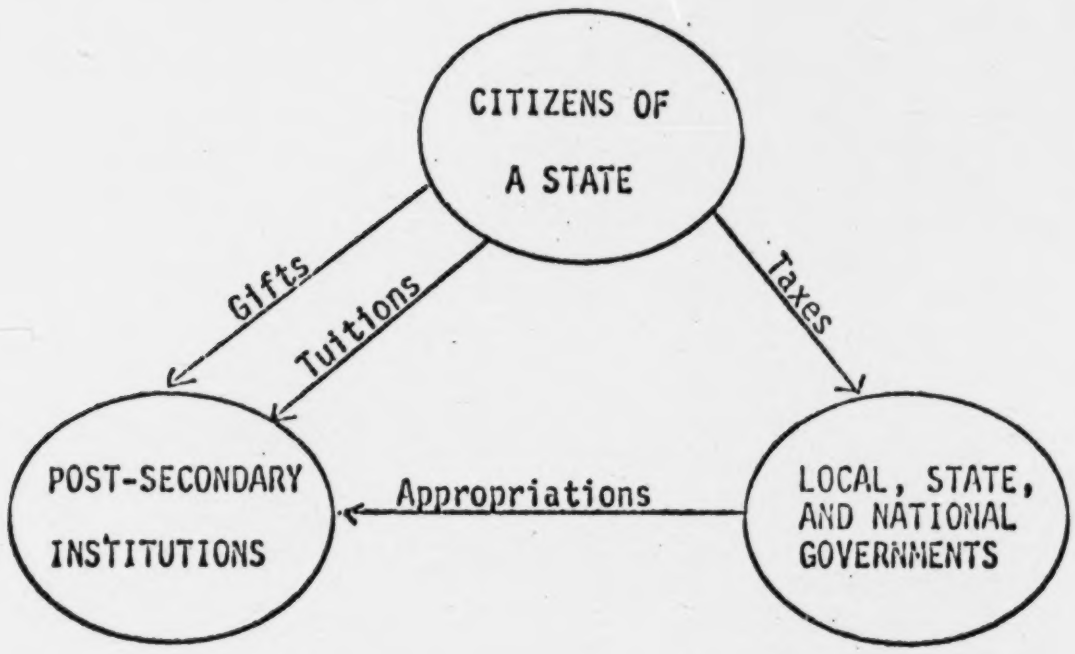

FIGURE 13: Educational Expenditures

People can monetarily support postsecondary education in many other ways, of course. Most of these ways, though, constitute a relatively minor source of revenues for institutions and are relatively small expenditures when compared with the gifts, tuition, and appropriation expenditures that are shown in Figure 19. For example, people support postsecondary education by buying tickets to cultural, academic, and sporting events. In an even more indirect sense, people support postsecondary education by buying goods and services

from companies who then make contributions to postsecondary education. None of these ways will, however, be further discussed in our proposal because we believe them to be quite small and difficult to measure.

It would be possible to count in the expenditures of a state, E_i, only one or two of the items in Figure 19. For example, E_i might be taken to include only tuition and appropriations. Even more restrictively, E_i might include only state government appropriations. We believe that such an approach is unwise for two reasons. First, it would give an undue advantage to those states that use funding sources that are "counted" in expenditures. For example, if E_i were defined to include only tuition payments, this definition would discriminate against those states that finance public postsecondary education, all or in part, through taxation. If, on the other hand, only appropriations were counted, this would discriminate against those states that use gift and tuition mechanisms. Since it is not the intent of this proposal to prejudge any mix of gifts, tuition, and appropriations that each state uses or may use to finance postsecondary education, we propose to aggregate all three financing methods. (If this list of financing methods must be pruned, we would recommend that the gifts method be first to go. Dollarwise, it is the smallest of the three components and is the most difficult method in terms of data acquisition. It would entail a system of reporting all gifts by a state's residents to postsecondary education. The only apparent way in which these data might be gathered would be to have each postsecondary institution report its gifts by the state in which the donor resides. Furthermore, the corporate gift problem would raise additional

difficult questions with respect to gift origins.) This approach will allow each state to establish that mix which is appropriate for its particular circumstances.

The second reason we believe all three expenditure methods should be included in E_i is to insure that state expenditure efforts are accurately measured. Assume, for the moment, that only tuitions are counted in E_i. A state then would have an incentive to cut back its appropriations and taxes and raise its tuitions by an equal amount. Note that while this action would leave the effort of people relatively unchanged--tuition dollars have replaced tax dollars--the E_i term would be higher, and hence the people of the state would be credited with a higher dollars effort. An even worse possibility in the case where only tuitions are counted is that a state could cut back on its appropriations, leave tuitions unchanged, and still be credited with the same dollar effort.

Of the three methods of expenditure, the tax method will undoubtedly require the most attention. One way of detailing this method is suggested in Figure 14.

The overall purpose of Figure 14 is to suggest <u>some</u> of the ways in which tax money from the people of a state can eventually benefit the postsecondary students from that state. In Figure 14, the people of a state are shown as the source of all tax dollars, and the postsecondary students of a state are

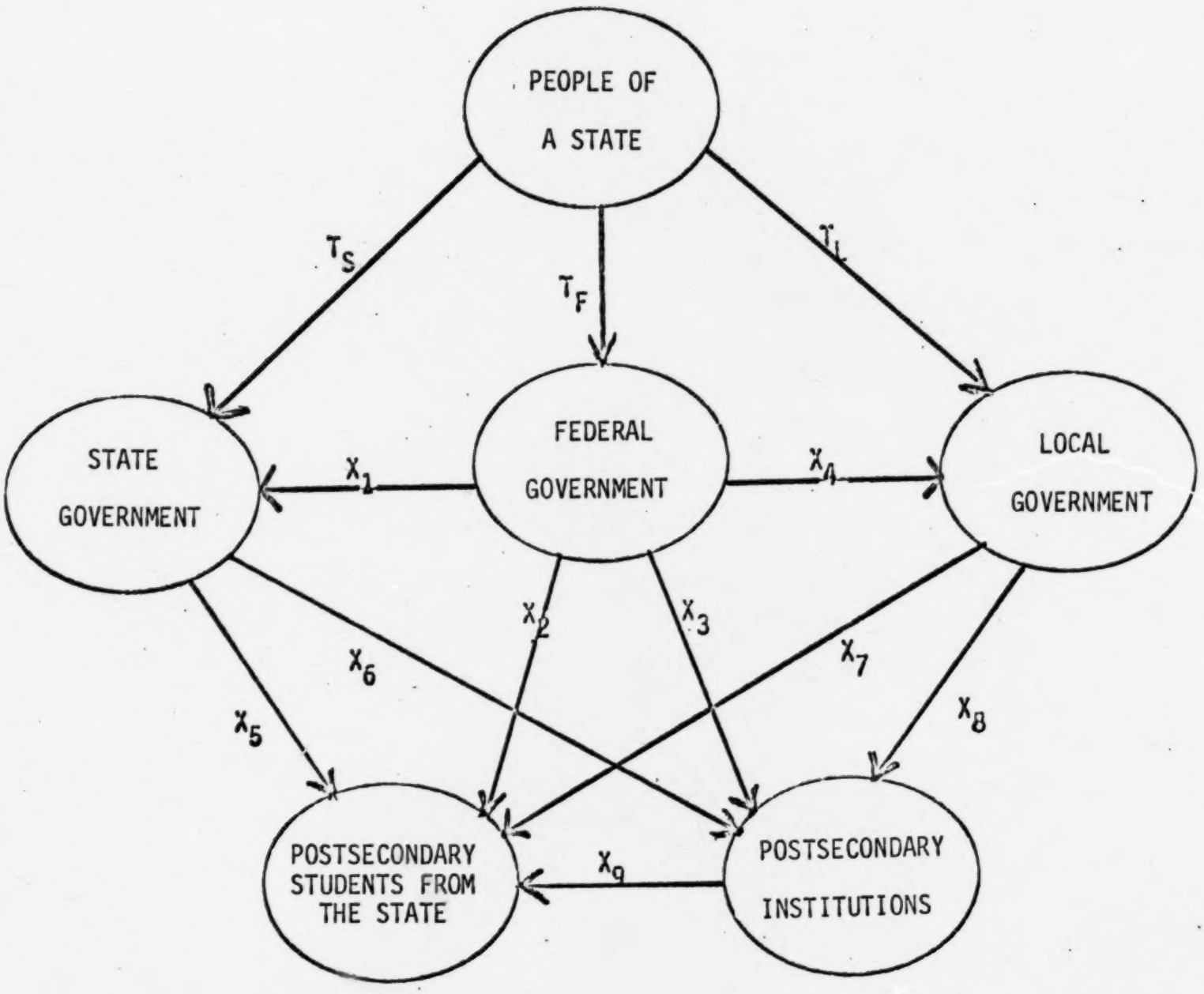

FIGURE 14: The Flow of Tax Dollars

Note: All arcs in the above figure are in dollars except for arc X_9 which is benefits.

shown as the eventual recipients of postsecondary benefits that these tax dollars permit.* Consequently, the general procedure for calculating any tax portion of E_i is to trace in Figure 14 the various ways state tax dollars, T_S, local tax dollars, T_L, and federal tax dollars, T_F, flow to any postsecondary student of any particular state.

The Treatment of State and Local Expenditures

State and local tax dollars are in general easier to trace than federal tax dollars. While state and local tax dollars are generally spent in the state in which they are collected, federal tax dollars are not so constrained. The only difficulty, then, with measuring state and local expenditures for postsecondary education -- X_5, X_6, X_7, and X_8 -- is to insure that federal funds --X_1 and X_4 -- are not included in the state and local total. The reason X_1 and X_4 should not be included in state and local expenditure totals is that neither is financed by state or local taxes, T_S and T_L. Furthermore, any federal effort made possible by federal taxes, T_F, will be counted elsewhere.

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*This paper will discuss only a few of the data problems important to our proposal. The identification and analysis of the mechanisms (on a state-by-state basis) by which various tax, tuition, and gift dollars flow into postsecondary education is a major task that we are currently undertaking.

In Figure 14 the state and local governments spend money that benefits a state's students in two ways. First, aid is given directly to students via paths X_5 and X_7. Institutions, which a state's students can attend, receive public support via paths X_6 and X_8. The benefits of a state's expenditures on public institutions are shown flowing to students through path X_9 in Figure 14. While it might appear that path X_9 could be substituted for paths X_6 and X_8, this is not the case because path X_9 contains some federal dollars, namely from path X_3. Thus, we will count as state and local governmental appropriations to postsecondary education through the tax mechanism the following terms.

$$(37) \quad E_{T_S+T_L} = (X_5 + X_6 - X_1) + (X_7 + X_8 - X_4), \text{ for the ith state.}$$

In Equation (37) we do not attempt to distinguish any intergovernmental flows between state and local levels. Because these flows will leave the combined expression unaffected, this additional complication is not considered. However, in Equation (37) state and local expenditures, X_1 plus X_4, which are attributable to federal taxes, are separated out.

The Treatment of Federal Expenditures

While state and local expenditures are earmarked for spending in the state in which they are collected, this is not true of federal taxes. Federal expenditures on a particular state's students (either directly to students or to institutions attended) do not bear a direct relationship to federal taxes collected from a state.

Many complicated schemes can be devised for allocating these federal tax dollars to education expenditures in a state. We suggest a simple method, given by Equation (38). The solution of this equation yields a federal expenditures <u>credit</u> to be added to other state expenditures efforts.

$$(38)\quad (E_{T_F})_i = rT_{F_i}.$$

Equation (38) says that a proportion called r of each state's federal income taxes, T_{F_i}, will be counted as expenditures on postsecondary education. The proportion r is equal for all states and is estimated as:

$$(39)\quad r = \frac{\text{Total Federal Expenditures on Postsecondary Education}}{\text{Total Federal Tax Revenue from Personal Federal Income Tax}}$$

The r term is an estimate of the percentage of personal federal income taxes spent by the federal government on postsecondary education. This same percentage is allowed each state as application against any federal income taxes its residents pay.*

In summary, the following postsecondary expenditures are "allowed" each state:

G_i refers to gifts made by residents of State i; T_i refers to tuition paid by residents of State i; $(E_{T_S+T_L})_i$ refers to state and local postsecondary expenditures made possible by state and local taxes; while $(E_{T_F})_i$ refers to

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*If we assume that federal income taxes bear the same relationship to income in each state, we can ignore the E_{T_F} term. This situation can be expressed as:

(a) $T_{F_i} = qY_i$, where q is a constant for all states.

If we refer to all other "allowable" expenditures as E_b, we have a relative

a federal postsecondary expenditures credit made possible through federal tax payments by residents of a state. A detailed description of these last two terms is given by Equations (37) and (38).

We have discussed how E_i can be defined in the Postsecondary Expenditures option of the basic proposal. To complete that proposal we still need a definition of the population term, N_i. Because the composite effort index defines enrollment effort as S_i/N_i, it follows that N_i must be defined in terms of people who realistically can be expected to attend postsecondary institutions.

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dollar effort of:

$$(b) \quad \frac{E_b + rqY_i}{Y_i} = \frac{E_b}{Y_i} + rq$$

Since the expression rq would be a constant for all states, its only effect is to shift the composite effort index up by a constant amount for each state. Hence, the rank order of the I_i indices is unaffected and the rqYi term could be dropped. However, we believe that q will differ significantly from state to state. States with the same aggregate income, Y_i, can still pay different federal personal income taxes, T_{F_i}, because of a nonlinear income tax structure. Hence, (a) above more accurately is written as:

$$(c) \quad T_{F_i} = q_i F_i$$

which leads to (b) rewritten as:

A few years ago it would have been relatively easy to obtain agreement on reasonable age limits for a prospective postsecondary education population. Postsecondary education was defined as consisting almost entirely of college experiences. Furthermore, college was something that naturally and immediately followed secondary education. Today, this situation is changing. Postsecondary education is expanding to include noncollege experiences and it is being reshaped to appeal to a broader cross section of the adult population.

The Newman report (1971, p. 8) in particular has argued against limiting higher education to specific age groups. For example, the report notes that:

> By long tradition, American colleges and universities discriminate against those who are older than "normal student age" and those whose established life and work patterns make returning to a campus difficult if not impossible. This exclusion is most pronounced at highly selective private and public institutions, but, as in so many other respects, these institutions carry a disproportionate weight throughout the higher education system. Many institutions have some kind of program of "continuing education," but these are generally relegated to third class status.

$$(d)\quad \frac{E_b + rq_i Y_i}{Y_i} = \frac{E_b}{Y_i} + rq_i$$

Relative dollar effort in (d) differs drastically from that of (b) because q_i will differ from state to state. Hence, the rq_i term will affect the ranking of composite effort indices, I_i. We use federal personal income taxes as a proxy for all federal taxes collected from the residents of a state. Hopefully, the distortions introduced by possible differential effects concerning federal excise and corporate taxes will not be large. The data difficulties of using all federal taxes are monumental.

Two methods can reflect this trend of expanding the age boundaries of post-secondary education. The simplest way is to define the postsecondary population of a state as all persons in a broad age group, perhaps eighteen through thirty-five years of age. The upper limit of this definition could be gradually increased in order to put pressure on states and their postsecondary education systems. This pressure may force a positive response to the needs of "older" people.

Probably more equitable would be a procedure for weighting the various ages from eighteen to some very large upper limit. For example, N_i might consist of fifty percent of the eighteen to twenty year olds in a state, twenty-five percent of the twenty-one to thirty year olds and so on. This approach would accomplish two things. First, it would recognize the fact that an older individual is less likely to attend postsecondary education than is an eighteen year old. Consequently, a state with a disproportionate number of older people would not be penalized by weighting these older people the same as younger people. The second advantage of this approach is that it makes explicit a public policy on access to postsecondary education for various age groups. The explicitness of this policy would undoubtedly lead to considerable debate; but this debate could be very useful in establishing norms for a national policy on access by age.

THE ELEMENTARY - SECONDARY EXPENDITURES OPTION (ESE)

Under this option a state's effort toward elementary and secondary education determines the level of federal support that a state's postsecondary students receive. For example, if the residents of a state spend more money on elementary and secondary education, the federal government will increase its dollar support of a state's postsecondary education students. To explain this option fully it is necessary to discuss how the expenditures term, E_i, and the population term, N_i are defined. However, before this task is undertaken, we will discuss the two major justifications for this option.

Constitutional and Legal Obligations of States

Education has long been recognized as one of the major functions of the states. This function of states has been recognized in two ways. First, it has been written into the state constitutions. For example, the constitution of the state of Washington (1971, Article IX) says:

> It is the paramount duty of the state to make ample provision for the education of all children residing within its borders, without distinction or preference on account of race, color, caste, or sex.

The Utah state constitution (1969, Article X) says on education:

> The Legislature shall provide for the establishment and maintenance of a uniform system of public schools, which shall be open to all children of the state, and free from sectarian control. The public

> school system shall include kindergarten schools; common schools consisting of primary and grammar grades, high schools; an agricultural college; a university; and such other schools as the Legislature may establish. The common schools shall be free.

Although the State of Utah must provide only free primary and grammar education in order to satisfy its constitution, it also provides free secondary education. In general, elementary and secondary education is provided "free" by all states.

A second way in which states recognize their education function is to make education mandatory between certain ages. These ages normally concide with the kinds of education that are provided free. In most states this means that elementary and secondary education are both free and mandatory. The ages of mandatory school attendance normally range from five to seventeen years of age. Some states make education mandatory from age six on and other states make education mandatory up to age eighteen. A few states include both extremes. Utah is one state in which education is mandatory from six to eighteen, as it is in Ohio. (National Center for Educational Statistics, 1969.)

These constitutional and legal requirements are an important justification for this option. If in any plan for federal financing of education, the federal government is concerned about state and local maintenance of efforts, it would seem reasonable that such maintenance of effort be related to areas that are already publicly recognized and accepted functions of states. Thus under this ESE option, the federal government would encourage states to spend more on elementary and secondary education. Such an encouragement seems appropriate, considering the constitutional and legal pressures that require states to provide education free to children of elementary and secondary age.

Preparation and Integration Aspects

An extremely important aspect of the ESE option is that states are explicitly encouraged by the federal government to prepare elementary and secondary students for postsecondary education. If a state makes a large effort to prepare students relative to its economic capacity, it will receive an appropriate assistance from the federal government for postsecondary education in the form of Federal Student Grants. Thus, the financial support that a state receives for postsecondary education is related to the depth of preparation that the state has provided in elementary and secondary education. If a state believes that it is imperative to provide its students with a quality elementary and secondary education, the federal government in turn will provide additional financial help to these students for their postsecondary education. This is significantly different from the PSE option which provides only indirect emphasis on how well a state may prepare its students for postsecondary education.

This justification in conjunction with the first justification argues that states should be rewarded for doing something that they have constitutionally and legally agreed to do: to prepare students for postsecondary education. We do not argue that all elementary and secondary education is concerned with preparing students for postsecondary education. Quite clearly, elementary and secondary education has many purposes. All we argue is that elementary and secondary education is concerned in part with preparing students for

postsecondary education. If preparation is recognized as a state function, we can make the distinction that the ESE option recognizes this responsibility while the PSE option does not.

Furthermore, states are encouraged by the ESE option not only to prepare students, but also to make postsecondary education opportunities available. A state is encouraged to prepare students for postsecondary education because its effort toward education is measured by its effort in elementary and secondary education. It is encouraged to make opportunities available in post-secondary education because additional federal dollars will facilitate this effort. The ESE option strongly encourages states to coordinate and integrate their planning for all levels of education.

While the situation differs somewhat from state to state, it is obvious that levels of education are not integrated, in a planning or a financing sense, at state levels. While many education commentators have noted this situation, nowhere has it been more elegantly described than in a book entitled Education and State Politics (Usdan et al., 1969, p. 1). The authors point out that:

> . . .it is interesting to take note of the basis on which the country's resources are allocated and organized for education. Perhaps no other term applies to this situation so well as "fragmented." Education is directed from three levels of government: local, state, and national. It is financed from a grab-bag of sources. In its most critical aspects it shows sharp variation from place to place, especially, but not exclusively, when those places are separated by state lines. Thus it is only in the most general sense that one can speak of an American educational system.

We do not suggest that this ESE option will or can remove all "fragmentation" in education. We only suggest that it can provide additional pressure for states to consider education as a whole rather than as a set of parts. It will force states to think of postsecondary education in terms of respective needs and efforts in elementary-secondary education and vice versa. Furthermore it establishes a partnership between federal and state governments in the financing of all levels of education.

Definitions of the Expenditures and Population Terms

For the Postsecondary Expenditures option, we concluded that E_i should include the terms shown in Equation (41). This same model of expenditures is equally valid for the Elementary-Secondary Expenditures option if the object of the expenditures is changed from postsecondary education to elementary-secondary education. It should be recognized that the gift and tuition mechanisms are much less prevalent and significant than they are in higher education. The gift and tuition mechanisms for supporting elementary and secondary education are more prevalent in the private than the public sector. The question of how to incorporate state expenditures on private elementary and secondary education is a difficult one. Data on these private expenditures is both scarce and unreliable. This paucity of data would seem to argue for leaving these data out; yet, our preliminary analysis has shown significant differences from state to state in this area. For these reasons Equation (42) seems a better choice for determining the magnitude of the expenditures term, E_i, in the Elementary-Secondary Expenditures option.

$$(41)\quad E_i = (E_{T_S+T_L})_i + (E_{T_F})_i$$

The $E_{T_S + T_L}$ term in Equation (42) refers to state and local governmental expenditures on elementary and secondary education. State and local expenditures made possible by federal monies must, of course, be removed from this total. The E_{T_F} term in Equation (42) refers to the expenditures by the federal government on elementary and secondary education that will be credited to the ith state. The derivation of this quantity will follow Equation (39) very closely. The only difference is that r should now be taken to be:

$$(42)\quad r = \frac{\text{Total Federal Expenditures for Elementary-Secondary Education}}{\text{Total Federal Tax Revenue for Federal Personal Income Tax}}$$

Thus, regardless of how much money the federal government actually spends on elementary and secondary education in each state, a certain portion of federal personal income taxes will be credited as part of a state's dollar effort on elementary and secondary education. The idea of designating a certain percentage of each state's personal income tax as education dollars is not new. The more usual form of this suggestion goes under the title of federal income tax for education. Under this scheme, a certain portion of each state's federal income taxes would be returned to it, revenue-sharing style, for use in education. (For a discussion of this proposal in relation to elementary-secondary education, see Hugh Calkins, "Financing Higher Education in the 70's," Today's Education, LX [February, 1971], 30-32.)

Our proposal does not go so far as to insist that the federal government return the same percentage of federal income taxes in each state. We do, however, credit each state with the same percentage of federal income taxes collected in the state. Furthermore, by simply redefining r, we suggest that this concept is equally valid in postsecondary education and in elementary and secondary education.

The definition of the population term, N_i, is modified in the PSE option to stress the flow concept that was mentioned earlier. The flow concept under this option is implemented in two ways. First, a state's expenditures on preparation for postsecondary education are counted instead of actual state expenditures on postsecondary education itself. Preparation expenditures are, of course, defined to be expenditures on elementary and secondary education. The second way that flow concept is implemented is to define the population in terms of <u>future</u> potential enrollees in postsecondary education rather than in terms of <u>present</u> potential enrollees in postsecondary education.

In the ESE option, then, the population is defined to include all persons in the state who are of elementary and secondary age. For example, N_i might be defined as consisting of all persons who are between the ages of six and seventeen. Each of these age groups might be equally weighted, or they might be weighted differentially to reflect the fact that the older age groups are nearer to entering the postsecondary eligible pool than are the younger age groups.

When N_i is defined to include all persons of elementary and secondary age, two effects take place relative to the enrollment ratio in the composite effort index, I_i. The enrollment ratio has been defined as S_i/N_i. The higher this ratio, the larger the effort that is attributed to state i. It should be noted that the definition of S_i is the same for both options. Namely, it is the number of students from state i who are enrolled in a postsecondary institution, in-state or out-of-state, public or private. Thus, the first effect of defining N_i as all people of elementary and secondary age is to put pressure on each state to have more of its elementary and secondary age people go into post-secondary education. Only if there is a flow of persons from the N_i term to the S_i term will a state be given a high mark for enrollment effort. The second effect of defining N_i as we have is to put pressure on each state to have all of its persons of elementary and secondary age in elementary and secondary institutions. The effect of defining N_i as we have in the second option is to treat each person of elementary and secondary age as though he were enrolled. Hence, the state that has a high elementary and secondary drop-out rate will have a harder time achieving the same S_i/N_i ratio as a state with low elementary and secondary dropout rate. The state with a low dropout rate will have prepared a larger percentage of its N_i population to go on to postsecondary education and hence there is an increased pool of people who can enter the S_i term.

The Elementary-Secondary Expenditures Option, then, stresses the preparation of a state's population for postsecondary education in two ways. First, it builds in an incentive for states to spend money on elementary and secondary

education by counting these expenditures in the E_i term. Secondly, it builds in an incentive for states to keep people of elementary and secondary age in school, by treating all persons of elementary and secondary age as though they were in school.

RELATIVE ADVANTAGES OF THE TWO OPTIONS

We have now described two options to the basic proposal that we presented in Part I. These two options, we believe, differ radically not just in a definitional sense, but more importantly in their impact on various levels of education and on the incentives that states have to support education. We will now attempt to present what we believe to be the relative advantages and disadvantages of the two proposals. While we will present advantages for each option, this discussion should not be interpreted to mean that the previously discussed advantages and disadvantages of our basic proposal are superceded.

We will compare the two options that we have presented in two areas. First, we will examine the possible effects that the two options might have on the amount of money, both federal and state, that is available for postsecondary education. Next, we will discuss the effects that the two options might have on the roles of the state and federal government in postsecondary education in the future. While these two areas are not the only areas in which we might compare the two options, we judge them to be areas of considerable concern to the educational community.

Combined State and Federal Monies Available to Postsecondary Education

In the discussion to follow, care must be taken to distinguish between two kinds of forces that are operative on the fiscal efforts of the states. First, there are those forces that exist independent of our proposal. These forces may be such that a particular state is motivated to spend money on one type of education but not on another. Second, there are those forces or incentives that are created by our proposal. Depending on which option of our proposal is being considered, these forces may tend to produce greater state expenditures in postsecondary education or in elementary-secondary education.

The Case of Constant Federal Dollars

In this situation no matter what the states do, the total federal dollars committed to this program are assumed to remain the same. Hence, if the F_i for some state increases from one year to the next, it will be only because the F_i for some other state (states) decreases by a corresponding amount. Thus one state can achieve incremental gains only at the expense of incremental losses of another state. This possibility exists even if both states increase their efforts over time but one state increases its efforts faster than the other. In this situation if states choose to spend more on postsecondary education, it follows that combined state and federal spending on postsecondary education will go up over present levels. The equity, though, of reducing federal support to those states whose <u>increases</u> are less than the increases of other states seems questionable.

Besides this equity problem with the PSE option in the case of constant federal dollars, there is another more serious problem. This is the possibility that states may maintain their level of federal support by choosing to do less rather than more. This possibility was discussed in our basic proposal as the state policy of maintaining combined state and federal spending on education at some predetermined level. For the PSE option this would mean that combined state and federal spending on postsecondary education would be maintained at some level.

In summary, then, the PSE option has two disadvantages in the situation where the federal government decides to spend a constant amount from year to year. First, there is the equity question related to decreasing federal support to those states that have the smaller increases. Second, there is the possibility that combined state and federal spending on postsecondary education will stay the same.

Under the ESE option additional federal dollars are not related to additional state expenditures on postsecondary education as they are in the PSE option. Hence, there is less of a likelihood under the ESE option that combined state and federal spending will go up. Furthermore, since federal dollars will be going into postsecondary education under the ESE option, there seems to be an incentive for states to cut back correspondingly on their dollar support of postsecondary education.

To review, the PSE option offers an incentive for states to spend more on postsecondary education but states can ignore this incentive of matching federal dollars and choose to spend less. The ESE option offers no incentives to spend more on postsecondary education and may offer an incentive for states to cut back their support since no federal dollars will be lost because of this withdrawal.

Any increases in state support of postsecondary education under the ESE option, then, will take place because of pressures external to the ESE option. In fact, increases in state support under the ESE option will have to take place in spite of the incentives inherent in this option to decrease state expenditures in the postsecondary area.

The Case of Variable Federal Dollars

Making federal support of postsecondary education a variable accomplishes one major task relative to the PSE option. It insures that all states that increase their dollar support of postsecondary education will be rewarded by increases in federal support of postsecondary education in these states. It does not, however, insure against the possibility that some states will cut back on their efforts in postsecondary education. While there is certainly a strong incentive in this option for states to spend more on postsecondary education because of the associated federal dollars, there is also the opportunity in this proposal for some states to substitute federal dollars for state dollars.

Under the ESE option, states that spend more on postsecondary education will receive the benefits of their own expenditures but there will be no "double benefit" because federal support will be unaffected by these postsecondary changes. States will be able to substitute federal dollars in postsecondary education for state dollars in postsecondary education to the extent that they are supporting elementary-secondary education. If they are not supporting elementary and secondary education as compared to other states, few federal dollars for postsecondary education will be forthcoming, and hence little substitution will be possible.

The comparison of the two options regarding the combined monies available to postsecondary education is thus a complicated matter. Several conclusions, though, do seem reasonable. First, a federal policy of spending a constant amount per year seems to dull the incentives available under either option and further introduces some inequities among states for the PSE option. Second, the PSE option seems to offer the better system of protecting against states reducing, over time, their expenditures on postsecondary education.

The Educational Roles of the States and of the Federal Government

The claim that control follows the "purse strings" is obviously an over-simplification, but certain kinds of financing arrangements are more likely to imply control than others. We believe that general institutional assistance is a financing arrangement that implies little control; the categorical grant, on the other hand, is a financing arrangement that is closely associated with certain kinds of control.

Yet, it is not just restrictions on the type of expenditures that constitute control. Control can also be exercised by the turning on and off of financial support. In this respect, the federal government has probably had a poorer track record than have the states. Since federal financing has often had a high degree of uncertainty associated with it, the fact that our proposal involves federal funding can be viewed as increasing federal control even though the form of the aid, general assistance, is relatively nondirective.

The Postsecondary Expenditures Option attempts to establish a joint responsibility between the states and the federal government for financing increases in the postsecondary system. The basic philosophy of this option is that if a state will take the lead in instituting quality or quantity increases in postsecondary education, the federal government will follow the lead of the state and match a portion of that state's expenditures. Since both the state and the federal governments are involved in these increases, some degree of control obviously flows to both of them. However, more control may reside with the state because it initiates the increase; its expenditures can be for very restrictive purposes; and federal expenditures are general assistance. Finally, it should be noted that this option leaves the distribution of state and federal control in elementary and secondary education unchanged.

The Elementary-Secondary Expenditures Option attempts to make the state responsible for financing increases in the elementary-secondary education system and to make the federal government responsible for financing increases in the

postsecondary system. Under this option, then, the states' control of elementary and secondary education probably will be strengthened. Further, it would seem that the federal government's control of postsecondary education probably will be increased.

In summary, then, it appears that there are significant financing and control differences between our two options. For the policymaker who believes that the states should retain their preeminent role at all levels of education, the Post-secondary Education Option seems the best alternative. For the policymaker who believes that the federal government should increase its role in postsecondary education and strengthen the states' role in elementary-secondary education, the Elementary-Secondary Option seems the best alternative. The fact that both of these plans are compatible with the advantages of our basic proposal is an important consideration and means that the selection of the option to be implemented can be made on the basis of policy rather than technical considerations.

CONCLUSIONS

As suggested in the beginning of this paper, there are many ways in which postsecondary education might be financed. These differ not only in the source of the dollars--states, students, the federal government--but also in the disbursement mechanisms--student aid, categorical grants, general assistance, tax relief. Of these many financing schemes we chose one as the topic of this paper: general assistance to institutions coming from the federal government. Even in this restricted area of financing schemes, our proposal is not the only possible alternative. (We have devoted considerable effort to the possibility of designing two complementary general assistance plans. One plan would provide general assistance dollars directly to each state, while the second plan would provide general assistance dollars directly to each postsecondary education institution. While the design of these plans is similar to the work reported here, there are some important differences. While we believe the idea of two complementary plans has a great deal of merit, because of time and resource constraints we are uncertain when we will be able to report our efforts on these plans.)

We believe that general assistance is an attractive financing scheme, especially in conjunction with some of the other financing methods that are currently operating and have been proposed. Furthermore, the approach to general assistance developed above seems worthy of consideration. It is substantially different from those taken by other analysts, and it seems to be particularly

valuable in developing specific policy implications of financing plans. Thus, we present our proposal not only as a particular prescription for improving the financing of postsecondary education, but also as a general methodology worthy of further discussion.

Of the many insights we gained by exploring our proposals, perhaps the most important is that even simple proposals are full of complexities. Of the many financing schemes, general assistance is apparently one of the more straightforward possibilities. Furthermore, our specific proposal for implementing general assistance is not unreasonably difficult. Still, it is obvious that many subtleties and implications need to be considered. Not only must the terms to be included be selected, but also their joint relationships and their specific definitions must be thoroughly investigated. These considerations, rather than being of secondary importance to the overall idea of general assistance, actually become the most important features of the financing scheme. Only when they are considered in detail is it possible to suggest the many faceted effects of general assistance on students, states, institutions, and the federal government.

The last observations we would like to make about our proposal have to do with the research that still needs to be accomplished. All that we have managed to accomplish in this paper is to suggest some of the theoretical implications of our proposal. At least two other tasks must be undertaken to determine the practicability of adopting one or the other of our options. First, the avail-

ability of data to implement this plan must be verified. Our preliminary impression is that significant data are available (or could be made available), but that ambiguities exist. Federal, state, and institutional data covering the same items and the same periods often show alarming discrepancies. These discrepancies must be better understood before the final details and definitions of our proposal can be presented.

The second task that needs to be accomplished might be described as the investigation of unintended correlations. We believe that our composite effort index is measuring a state's relative dollar and enrollment efforts. Yet, it may be that this index is sensitive to only one or two terms, or that movements in this index are usually assoicated with movements in other terms not included in our index. Some of these correlations with other terms may suggest that our proposal, which is intended to accomplish one thing, will end up accomplishing another.

So, there remains more to be done. But, hopefully, a start has been made in understanding more fully the implications of general assistance. If this is so, this paper will have served its purposes.

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